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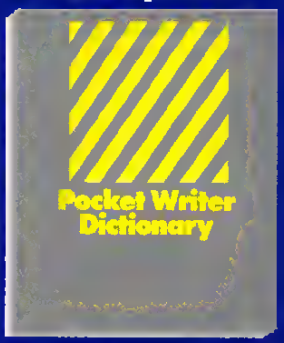

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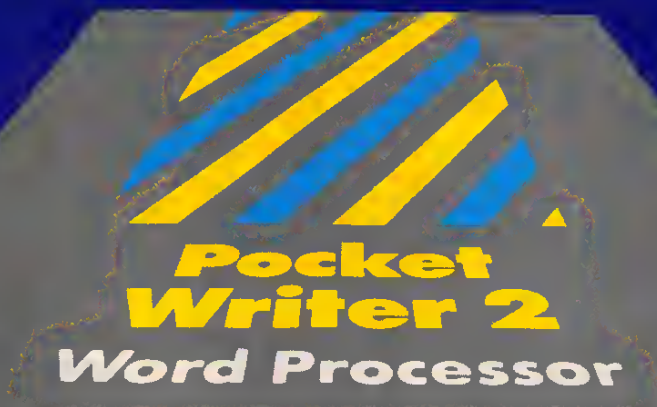

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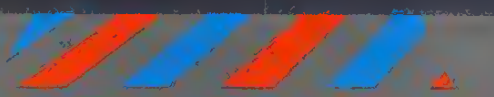

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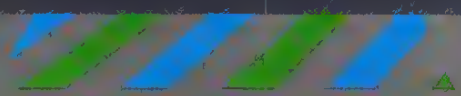

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NOTE: See page 93 before typing in programs.

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Editor's Notes

David Thornburg's recent comments on piracy have evoked some stimulating reader responses. We generally have found, over the years, that those who scream the loudest about their right to steal software exhibit some pretty convoluted logic. Example: The company who makes it charges too much for it. Solution: This makes it okay to copy? The list goes on. We've quoted here from a letter that we feel provides an excellent example of some not-so-legitimate concerns. Although the author failed to include a name or address, we'd like to comment on some of his or her remarks.

...I feel that the software companies are making out like bandits. They charge outrageous amounts for programs that are not worth the money that is charged.

A more traditional belief in our society has upheld the theory of the free market rather than free theft. The free-market theory argues that a vendor who gouges, or delivers less than true value for one's dollar, will eventually be caught up with by the marketplace. Here's another novel argument our friend advances:

...I support pirating and have on tap possibly 600 disks for both the Apple and IBM XT...[If]...I had to pay for them I would have more money in the software than I do in my house. And this is over $300,000...

This one's great. The logical extension of this argument is that we should collectively become a community of thieves. Given our need for software, and what apparently has become an inherent right to possess software, the solution to the expense of collecting it becomes pure thievery. The rest of us are fortunate that this same logic hasn't begun to be applied to houses and cars. Now we're getting to the real heart of the arguments.

We've covered the justifications of overcharging, in various guises, and now turn to the converse:

...do not give me that it hurts the developer of the code. All companies and corporations buy hundreds—if not thousands of copies of the program at the price (if not higher) that the publisher asks for.

In other words, either the software company already makes enough money, *or* it has already factored individual theft into its corporate sales. This is logic similar to the present arguments over liability insurance. Eventually everything has some impact, positive or negative, on the individual consumer.

Software piracy, and theft, cannot have a beneficial impact. As an activity generally shielded by, for example, one's right to privacy, enforcement of software rights is quite difficult. It's one of those areas where there's a gray area between community standards enforced by fear of exposure and community standards enforced by one's own sense of duty to that community. We personally feel that is the response to our friend's final remark.

...if the software industry wishes me to buy and use software legally, they must give me more reason to, other than the pity stories of the developers losing money.

Every time we mention something related to software piracy, some reader raises the question, "How can you run advertisements for software designed to help users copy protected disks if that's the way you feel?" There's one significant reason. We used to decline advertising that in any way promoted utilities designed for copying protected software. After the copyright law was amended to allow for a software owner's right to make and store a backup of software, we amended our policy to support that notion. In short, we accept such advertising when it subscribes to those purposes supported in the copyright law. We refuse and routinely reject piracy-oriented advertising. There's a sense of semantic jousting with windmills here that's inescapable under the circumstances, simply because we can't avoid the fact that some people will use legitimate backup programs to make duplicate copies for nonlegitimate users of a product. There is no doubt in our minds that such use can only be described as theft, regardless of the various arguments, such as those above, raised to support it. On the other hand, we feel quite strongly that a user has a full right to make and keep a backup. Some companies have attended to this by providing users with a backup. Others have chosen to avoid copy-protection altogether. Still others have made provision for obtaining a backup. In short, we support the notion of having access to a backup. We don't support the notion of using that need to justify distribution of the software.

In this case perhaps we should ask the question, "When is the media the message?" That seems to be the heart of a recent debate over CompuServe's exercise of its right to limit distribution of software that is undeniably public domain software. The more heated proponents of the public domain position argue that CompuServe is somehow appropriating the public domain products. We think this is an oversimplification, and as CompuServe points out, it is in fact attempting to promote and assist the utilization of such software by its subscribers. Understandably enough, CompuServe is not trying to promote and disseminate such software to those who are not subscribers. Seems fair enough. You'll find a couple of sometimes contrasting points of view on pages 30 and 31.

Until next time, enjoy your COMPUTE!.

Robert C. Lock
Editor in Chief

We welcome Sheldon Leemon and his new column, "Microscope," to the pages of COMPUTE!. Microscope will focus on industry news and what's on the horizon in the world of microcomputers. Sheldon, a free-lance author based in Michigan, has written two COMPUTE! books—*Mapping the Commodore 64* and *Inside Amiga Graphics*—and coauthored *COMPUTE!'s AmigaDOS Reference Guide; MacTalk: Telecomputing on the Macintosh*; and *COMPUTE!'s Telecomputing on the IBM*. The column debuts on page 66 in this issue.

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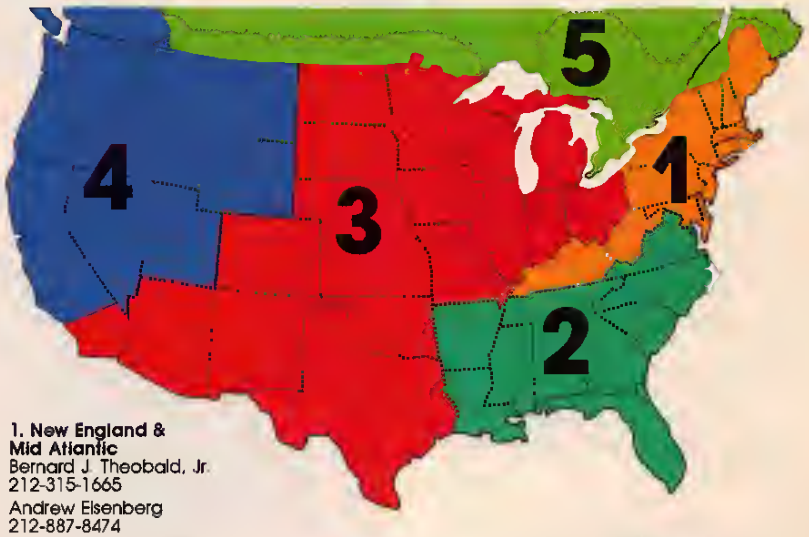

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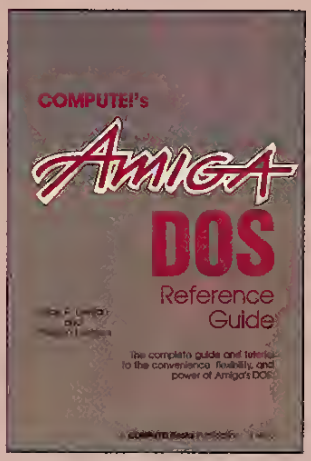

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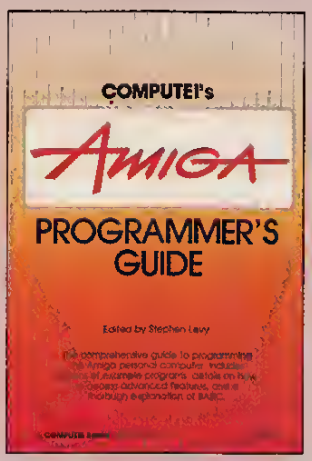

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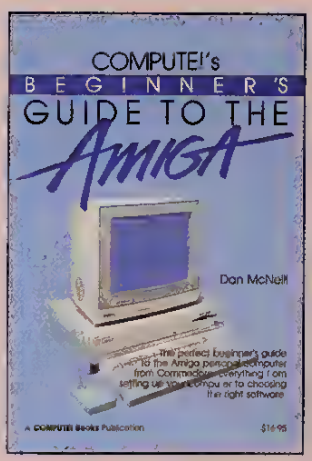

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Overseas Computing

I would very much appreciate an authoritative answer to my questions. I plan to purchase a Commodore 128 computer with 1902 monitor, 1571 disk drive, Datassette, printer, and joysticks. This set will be used in Poland where the power supply frequency is 50 hertz and the voltage is 220 volts AC. I can obtain a suitable step-down transformer to convert the voltage to 110 volts, but the frequency will be unchanged. Will this system work correctly with 50-hertz current?

I have visited numerous dealers in the New York City area. Some say that this equipment will work in Europe, others say that it won't work, and others simply don't know. My letter to Commodore has not been answered. I can easily purchase all of these items in Western Europe, but would prefer to buy them here and ship them to Poland. At the current exchange rates, this system will cost roughly twice as much in Europe as it does in the U.S.

M. H. Trenker
Chairman, Dept. of Surgery
Medical School
Gdansk, Poland

Though your question pertains to Commodore computers, the answer is generally the same for all U.S. computer systems. It is possible to use a step-down transformer to achieve the proper operating voltage, but you need to be sure that you do get a high-quality transformer. The small "voltage converter" units available for running hair dryers and such are not an acceptable substitute. However, the transformer may not solve all the problems of using a U.S. system overseas.

The most significant hurdle is that Europe and North America use different video standards. Televisions and monitors generate video displays by repeatedly drawing a series of horizontal lines across the screen, one under the other. Computers using the European (PAL) standard generate a frame of 312 lines redrawn 50 times per second, while those using the North American (NTSC) standard produce a frame of 262 lines redrawn 60 times per second. The Commodore 64 and 128 handle scan-line differences by providing two different versions of the VIC-II video chip—one for NTSC and one for PAL. The drawing rate is determined by an internal quartz crystal, with different crystal frequencies used for NTSC and PAL systems. While we have no direct experience with the situation, it is our understanding that a complete U.S. system—with both the computer and monitor designed for NTSC—should work in Europe if provided with the proper operating voltage. However, it is not possible to intermix U.S. and European equipment. You can't hook a European (PAL) monitor or television to a U.S. (NTSC) computer, or a PAL computer to a NTSC monitor or television.

Disk drives are another area of confusion. Like that of the computer, the internal operating frequency of a Commodore drive is determined by a quartz crystal, and thus should not be affected by international variations in power-line frequency. However, the speed of the motor which spins the disk may be affected. The older 1541 disk drives have a speed adjustment and a strobe pattern on the drive flywheel to allow adjustment for either 60-hertz (North American) power-line frequency or the 50 hertz used in most of Europe. The 1571 drives we have seen lack this adjustment, but it may not be necessary because the 1571 uses a more sophisticated type of motor.

Unless you plan to travel frequently between the U.S. and Europe, you may find it simpler to purchase equipment designed specifically for the environment where it will be used. We'd be interested in hearing about the experiences of any readers who have attempted to use their computers overseas.

Autobooting ST Programs

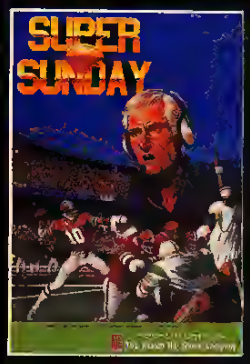
In the June 1986 issue of COMPUTE!, you explained how to make an ST program autoboot (load and run when you turn on the computer) simply by putting the program in a disk folder named AUTO. I have used this method and it seems to work for every program except *1ST Word*, the word processor supplied with the ST. Is it possible to make this program autoboot? Also, I have tried to autoboot programs in medium resolution with a color monitor. Can you tell me whether it's possible to autoboot a program in medium instead of low resolution?

Raymond Norris

As part of the boot process (caused when you turn on the power, press the reset button, or unplug the video cable) the ST checks the disk in the drive to see whether it contains a folder named AUTO. If so, it loads and runs the first program in AUTO which ends with the filename extension .PRG. These steps are performed by the BIOS (Basic Input/Output System) before *the computer boots GEM, the ST's visually oriented operating system interface. Since you can't run a GEM program without GEM, you can't autoboot any program that takes advantage of GEM's windows, menus, icons, and mouse. Under ordinary circumstances, autobooting works only with TOS or TTP (TOS-Takes-Parameters) programs, which are limited to conventional text, keyboard, and input/output operations.*

The answer to your second question involves the boot process as well. When it does a cold start, the ST defaults to low resolution for a color system or to high resolution for a monochrome system. If it can't find a .PRG program in an AUTO folder, the computer boots GEM and eventually looks for a file named DESKTOP.INF. The DESKTOP.INF file (created with the Save Preferences option) records the screen resolution, color palette, and much additional information about the desktop. If DESKTOP.INF is found, the ST reads it and sets the desktop to match your stored preferences. When you autoboot, however, the computer transfers control to the designated program before it has a chance to read DESKTOP.INF. As a result, you are always in low resolution after autobooting unless the program itself resets the video display for medium resolution. Low resolution is also in effect if the system finds neither an autobooting program nor a DESKTOP.INF file.

Other parts of the boot process check whether a cartridge is present or the disk contains a special boot sector. If either



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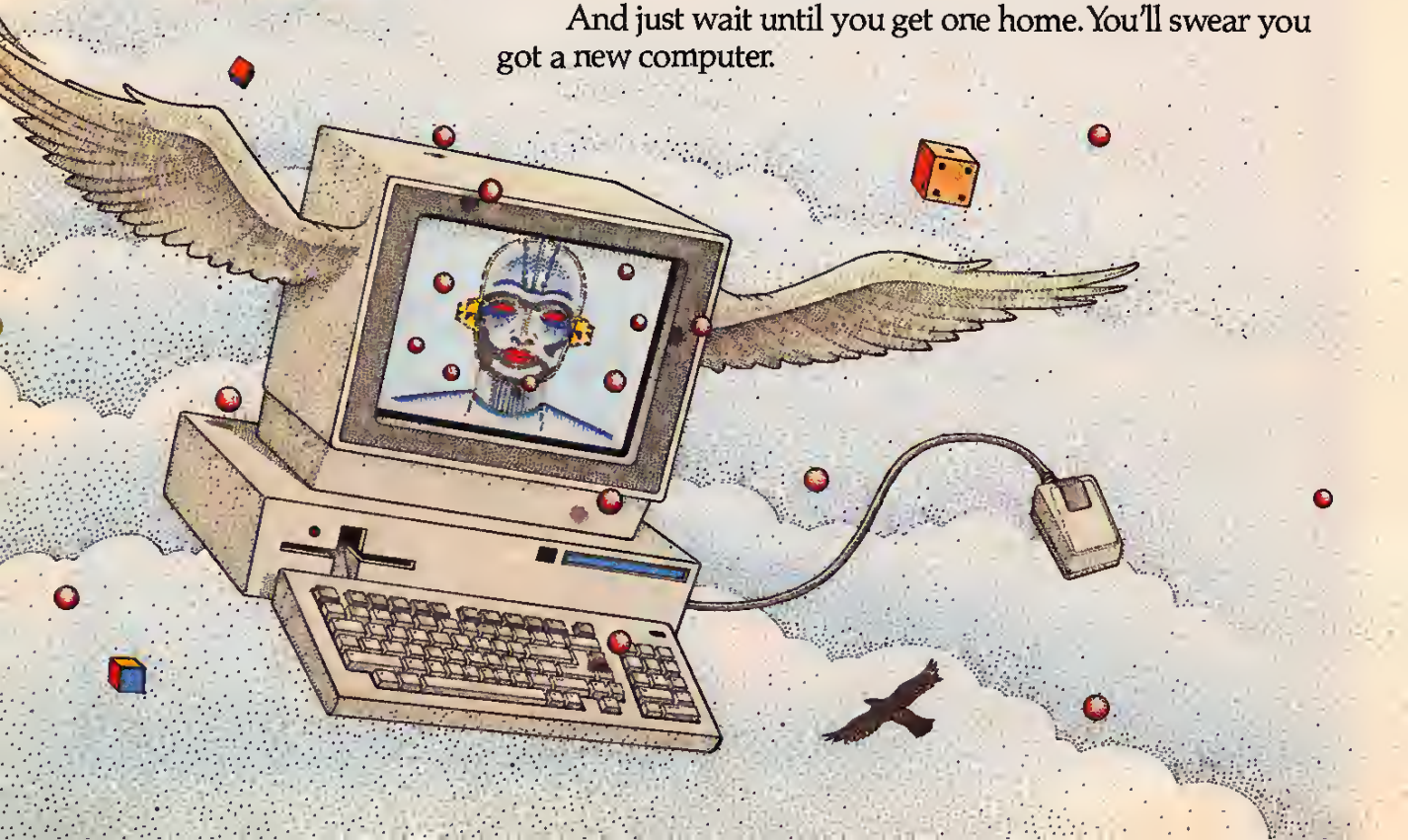

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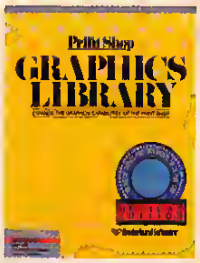

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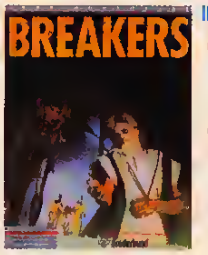

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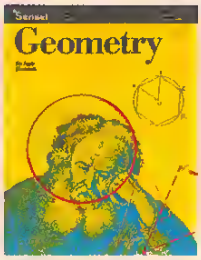

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condition exists, control is diverted from the normal boot process to the machine language program found in the cartridge or the boot sector. Once this occurs, it's up to that program to set the resolution as needed.

Applesoft B Commands

I am familiar with the Applesoft BASIC commands LOAD, SAVE, and RUN. These commands sometimes show up in your magazine with the letter B in front. What do these commands do?

Bruce Meulendyke

BSAVE, BLOAD, and BRUN are used to save, load, and run binary files. A binary file often consists of a machine language program, but it can also contain other data such as a screen image. Here's the syntax for BSAVE:

BSAVE filename, Aaddress, Llength, Sslot, Ddrive, Vvolume

BSAVE saves the contents of a designated memory area to a disk file. Every BSAVE command must include at least three parameters: a filename, the letter A followed by the starting address of the memory area you wish to save (add a $ after the A if you supply the address value in hexadecimal), and the letter L followed by the length of the area to save (you can also add a $ after the L to supply the length value in hexadecimal). The last three parameters (S followed by a slot number, D followed by a drive number, and V followed by a volume number) are optional. (The volume number parameter is valid for DOS 3.3 only.) Here's the syntax for BLOAD:

BLOAD filename, Aaddress, Sslot, Ddrive, Vvolume

BLOAD loads a binary file from disk into the computer's memory. Only the filename parameter is mandatory. The other parameters take the same format as for BSAVE (indicate hexadecimal numbers with a $). If you supply a load address, BLOAD loads the binary file into the designated memory area. If the address is omitted, the computer loads the file into the same area it was saved from. Note that you needn't specify the file's length: The computer simply loads until it reaches the end of the file. Here's the syntax for BRUN:

BRUN filename, Aaddress, Sslot, Ddrive, Vvolume

BRUN assumes that the binary file contains a machine language program. It performs a BLOAD of the designated file, then starts the program by performing a JMP to the beginning of the file. Just as with BLOAD, the address, slot, drive, and (for DOS 3.3) volume parameters are optional. BRUN offers a very convenient way to load and run a machine language program, since you don't need to know where the program goes in memory. Some other computers (the Commodore 64, for instance) require that you start an ML program with a SYS to the correct address after you've loaded it.

Atari DOS Mystery

After reading "Atari Disk Speedup," ("Readers' Feedback," November, 1985), I POKEd off the verify function and created a new copy of DOS 2.5 with this enhancement. Shortly thereafter I noticed that any file I save to disk has angle brackets (<>) on either side of the filename in the DOS directory. Is this normal?

Mark A. Jossart

DOS 2.5 uses angle brackets around a filename to indicate that that file cannot be accessed by the old DOS 2.0. This is only important if you boot up with DOS 2.0 (a single-density DOS) and want to use a file on your DOS 2.5 (enhanced-density) disk.

It's possible that your POKE and the angle brackets are unrelated. If you have used more than 710 sectors of your disk, it is likely that you have no problem. There's a chance, however, that you have confused DOS. To be safe, you might try booting up with an unmodified copy of DOS 2.5 and using the WRITE DOS option on your problem disk. Of course, you should always perform any changes to DOS on a copy of the master disk, not the master disk itself.

If you have the SETUP.COM file which comes with DOS 2.5, load it from the DOS menu with the L option. This is the preferred way to make the change. Otherwise, here is the POKE:

POKE 1913,80

Use the WRITE DOS option to save the change.

Disguised Input In BASIC

I have a Commodore computer and am writing a program with a code system. When I type in the code, anyone standing nearby can see it. Is there a way to replace each character in the code with an X or any other letter in order to disguise the code? I have noticed that 24-hour bank machines use this method to hide their customers' codes.

Michael Hamm

This simple routine waits for you to enter the word JUJUBE. Though it's written for Commodore computers, only slight modifications are needed to convert it for any computer with Microsoft BASIC. Use the DEL key to erase mistakes; input terminates when you press RETURN.

```
10 CODE$="JUJUBE"
20 B$="":PRINT"ENTER PASSWORD"
30 GET X$:IF X$=""THEN 30
40 IF X$=CHR$(20) AND LEN(B$)>
   0 THEN PRINT X$;:B$=LEFT
   $(B$,LEN(B$)-1):GOTO 40
50 IF X$=CHR$(20) THEN 30
60 IF X$<>CHR$(13) THEN PRINT"
   X";:B$=B$+X$:GOTO 30
70 IF B$<>CODE$ THEN PRINT:PRI
   NT "INVALID CODE":GOTO 2
   0
80 PRINT "WELCOME"
```

IBM BASIC Versions

I would like to know the difference between IBM BASIC and BASICA.

Glenn Kupsch, Jr.

IBM has created four different versions of BASIC for the PC and PCjr. They are known as cassette BASIC, disk BASIC, advanced BASIC (BASICA), and cartridge BASIC. Cassette BASIC is the simplest version. It resides in 32K of ROM and does not permit any disk commands or graphics other than plain text. If you boot up a PCjr without a BASIC cartridge, it activates cassette BASIC automatically. Cassette BASIC is rarely used on the PC, since few, if any, PCs were sold without a disk drive (in fact, the PC XT doesn't have a cassette port at all). However, you can activate cassette BASIC on the PC by booting the computer without a disk in the drive.

Disk BASIC must be loaded from disk, and requires at least 32K of RAM as well as a disk drive. Disk BASIC includes the commands in cassette BASIC as well as a timer function and support for RS-232 communications and two additional printers. BASICA, or advanced BASIC, is the most comprehensive version of IBM BASIC for the PC. It requires 48K of RAM and a disk drive. In addition to the disk BASIC commands, BASICA supports event trapping, which lets you monitor several different kinds of events (keyboard, joystick, light pen, timer, and RS-232 activity) in the background. Music and advanced graphics operations are also made available through commands such as PLAY, CIRCLE, PUT, GET, PAINT, and DRAW.

If you boot up a PCjr with a BASIC cartridge, the computer activates cartridge BASIC—an enhanced version of BASICA which supports the PCjr's extra features. In addition to most BASICA commands, cartridge BASIC offers extra screen modes and new graphics commands such as PCOPY, PALETTE, and PALETTE USING.

You can tell what version of BASIC you're using by looking at the version identifier in the BASIC startup message. The identifier C stands for cassette; D stands for disk; A stands for advanced BASIC; and J stands for cartridge BASIC (the J signifies junior). Some versions of IBM BASIC have gone through one or

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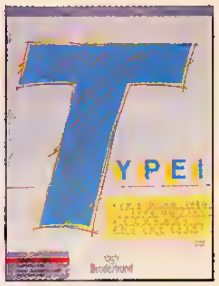

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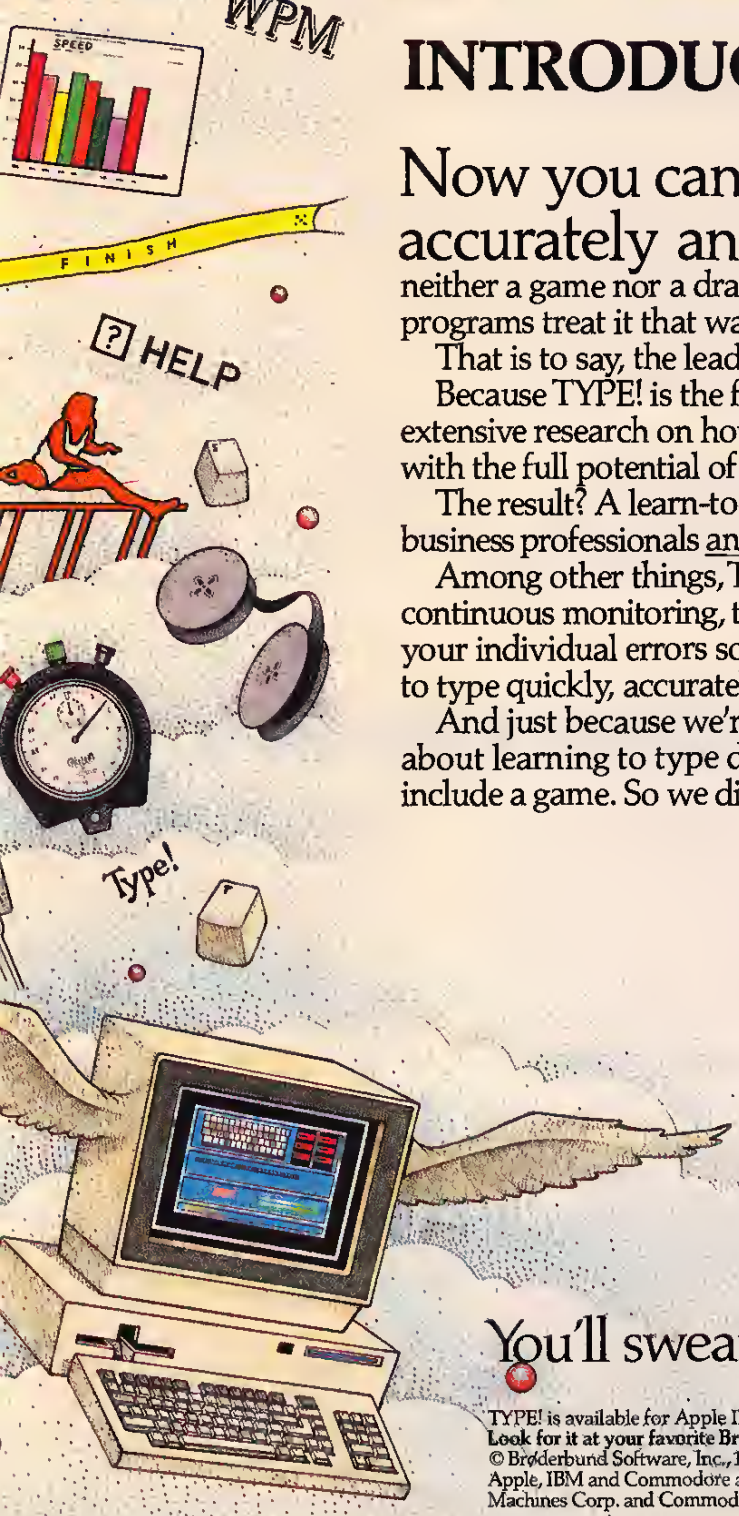

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more revisions. The number after the identifier tells you which revision you are using. For instance, cassette BASIC on the PCjr is Version C1.20, while the PCjr's cartridge BASIC identifies itself as Version J1.00, indicating that cassette BASIC was revised twice but cartridge BASIC has not yet been revised.

With minor exceptions, the more advanced versions of IBM BASIC understand all the commands in simpler versions. Thus, most cassette BASIC or disk BASIC programs run with BASICA on the PC or cartridge BASIC on the PCjr. But the reverse is not necessarily true. The PCOPY command, for example, is unique to cartridge BASIC, so it's not available in any other version. One exception to the general rule of upward compatibility appears in cartridge BASIC, which doesn't support the SHELL command found in both disk BASIC and BASICA.

Certain BASIC statements also require extra hardware. On the PC, a serial interface card is required for RS-232 communications, and a color/graphics card is necessary for color graphics. On the PCjr, you must have an internal modem in order to use telecommunications programs or the built-in terminal emulator (activated with the command TERM).

The PC and PCjr know whether you have the hardware needed to support special BASIC commands. If you attempt to use RS-232 or graphics features without the right hardware, the computer responds with the error message Illegal function call *or* Device unavailable. *In other cases, BASIC informs you that you're trying to do the impossible. Disk BASIC, for example, generates the error message* Advanced feature *when you attempt to execute a statement found only in BASICA.*

The PCjr is a special case when it comes to booting BASIC. Since it's designed for cartridge BASIC, it intercepts any attempt to boot other versions from disk. When you type BASIC or BASICA at the DOS prompt, the PCjr ignores your request and activates cartridge BASIC instead. However, there's a simple trick that allows you to run BASICA on the PCjr (to take advantage of the SHELL command, for instance). Simply copy BASICA onto a disk and rename it as BASICB; then type BASICB from the DOS prompt. Actually, any letter will do in place of the A in BASICA. By renaming disk BASIC as BASICD (or anything other than BASIC or BASICA) you can also run that version of BASIC on the PCjr.

Saving Atari Graphics

I am writing a drawing program in BASIC for the 130XE. I would like to add the screens I create to my BASIC programs, but I don't know how to save and retrieve the finished pictures on disk in various GRAPHICS modes, including the new 6½ and 7½ modes. I hope you can help.

A. Rosamilia

Here's one way to do it. This program is taken from the book Mapping the Atari, *written by Ian Chadwick and published by COMPUTE! Books.*

```
1000 SCREEN=PEEK(88)+PEEK(89)*
     256
1010 OPEN #2,8,0,"D:PICTURENAM
     E"
1020 FOR TV=SCREEN TO SCREEN +
     N:BYTE=PEEK(TV):PUT #2,
     BYTE:NEXT TV:CLOSE #2
```

This program copies the screen to a disk file. You must first set N in line 1040 to the number of bytes you need to save. Use the chart below to determine the value of N.

Graphics mode	Full screen	Split screen
7	4200	4190
14	4270	4296
15	8112	8138

To retrieve your screen, use this program segment:

```
2000 SCREEN=PEEK(88)+PEEK(89)*
     256
2010 OPEN #2,4,0,"D:PICTURENAM
     E"
```

```
2020 FOR TV=SCREEN TO SCREEN +
     N:GET #2,BYTE:POKE TV,B
     YTE:NEXT TV:CLOSE #2
```

These programs use the GET and PUT commands, which are used to communicate with input/output devices like the disk drive. Your letter uses the terms GRAPHICS 6½ and GRAPHICS 7½. These names became popular during the reign of ATARI 400 and 800 computers, when these modes were not available directly from BASIC. ATARI XL/XE computers call these modes 14 and 15. To set up mode 7½, just use the command GRAPHICS 15.

Dvorak Keyboard Update

Here is some follow-up information for the COMPUTE! reader who was interested in converting his Commodore 64 to a Dvorak keyboard ("Readers' Feedback," August, 1986). There are many products available for the 64 and other computers, ranging from inexpensive keycap overlays and emulation software to complete replacement keyboards and ROM upgrades. I'm sorry that you discouraged the reader by quoting the *BYTE* article from February, 1986. That article investigated only one topic—finger travel—and its results are controversial. The authors used a computer simulation, which is error-prone because of the assumptions inherent in any such program. In response to the article, a top English keyboard expert (Professor Hisao Yamada, University of Tokyo) noted that several factors influence the results when measuring finger travel, and it is very difficult to get accurate measurements.

It is a combination of factors, not any single factor, that makes Dvorak superior in the view of myself and others. According to a controlled study by the U.S. government, Dvorak can result in a 74-percent productivity increase over the qwerty method. It can be learned in less time, finger travel is less (how much less is controversial, but it is clearly less), and Dvorak results in higher speed and accuracy. If any of your readers want more information on the Dvorak method, including a list of products available for personal computers, please send a self-addressed, legal-size envelope with 39 cents in postage to me at the following address. I will also enclose a free copy of the "Dvorak Developments Newsletter."

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Thank you for offering this additional information.

Reversing *SpeedScript*

Until recently, many of COMPUTE!'s foreign readers could not use *SpeedScript* because their languages use a different form of letters. That problem was solved by Charles Brannon's "*SpeedScript* Fontmaker" (COMPUTE!, January 1986), which allows you to create your own custom character set. I'm sure that this program has made it possible for a large number of foreign readers to use this superb word processor. There are, however, some readers who still can't use *SpeedScript*—those from Israel and the Arabic countries. In those languages, writing proceeds from right to left, so a word processor whose cursor moves left to right is of little use. Can you make another small step (at least, I think it's small) and add a subroutine which permits us to write either from right to left or left to right?

Dov Ratzman

You're correct in your suspicion that the problem isn't as simple as it first seems. The direction of writing is far from a mere cosmetic feature of SpeedScript*: It's bound up with the fundamental structure of the program. To explain, at the heart of* SpeedScript *is a routine labeled Refresh, which redraws the entire screen display every time you press a key. In essence, Refresh scoops a screen-sized chunk of*

text from the text portion of memory and displays it in the computer's screen memory area.

SpeedScript's *text memory begins immediately above the end of the program itself. As you type in more characters, the text grows upward into higher memory locations. Screen memory is also arranged sequentially, with lower memory locations at the upper left corner of the screen and higher locations toward the bottom. A higher location in text memory corresponds to a higher location in screen memory. To display a screenful of text,* SpeedScript *moves characters one by one from a section of text memory into screen memory, automatically* wrapping *words which overlap the right screen border, until the entire screen is full. Since the Refresh routine is called so often, it must also be very fast.*

To write from right to left, you would need to begin by rewriting the Refresh routine to display words in right to left order. Such a change destroys the simple, lower-to-higher correspondence between text memory and screen memory. In itself, the modification isn't impossible. However, it would add significantly to the size and complexity of Refresh and slow the routine somewhat.

Once Refresh had been rewritten, you would also need to rewrite all the routines that move the cursor from one character, word, sentence, or paragraph to another. Under the present scheme, moving the cursor forward (right) moves you forward in the text, which corresponds to a higher location in both text memory and screen memory. In a right-to-left SpeedScript, *moving the cursor forward (right) along a screen line would move you forward (higher) in text memory, but backward (lower) in screen memory. When you hit the end of the line, you would need to jump to a* higher *screen memory location, without changing your location in text memory, and begin working your way backward (down) to the next line. Word-wrap, in particular, becomes much more difficult to implement under such circumstances.*

Of course, if text is displayed from right to left, you'll want to print it the same way. A surprisingly large portion of SpeedScript *involves printed output—which includes printing to disk, tape, or the screen, as well as with a printer. Rewriting these routines creates the same type of difficulties outlined above.*

In short, what seems like a small change adds up to a very ambitious programming project which would change the size and location of nearly every routine in the program. In the past few years, we've published a number of SpeedScript *enhancement programs such as "SpeedView" (elsewhere in this issue) and "SpeedCheck," the spelling checker (*COMPUTE!'s GAZETTE, *December 1985). Those programs, and the various modifications which have appeared in this column, depend on the fact that you can find certain parts of* SpeedScript *at certain locations in memory. Modifying* SpeedScript *to display text from right to left would render most, if not all, of those programs and enhancements useless.*

Binary Number Converter

I am working on an Atari 800XL program that needs to convert a decimal number such as 255 to a binary digit such as 11111111. IF statements would work, but they seem very inefficient. Can this be done without IF statements?

Danny Maupin

Here is a program that does quick decimal-to-binary conversions:

```
10 NDIG=8:DIM BIN$(NDIG)
20 PRINT "DECIMAL NUMBER";
30 INPUT DCM:GOSUB 10000
40 PRINT "BINARY:";BIN$
50 GOTO 20
10000 PK=128:BIN$="":WUN=1
10010 FOR LOOP=WUN TO NDIG
10020 LB=LEN(BIN$)+WUN
10030 BOO=DCM>=PK
10040 BIN$(LB)=CHR$(48+BOO)
10050 IF BOO THEN DCM=DCM-PK
10060 PK=PK/2
10070 NEXT LOOP
10080 RETURN
```

As listed, the program only converts numbers in the range 0–255. To expand its range to 0–65535, change the 8 in line 10 to 16 and the 128 in line 10000 to 32768.

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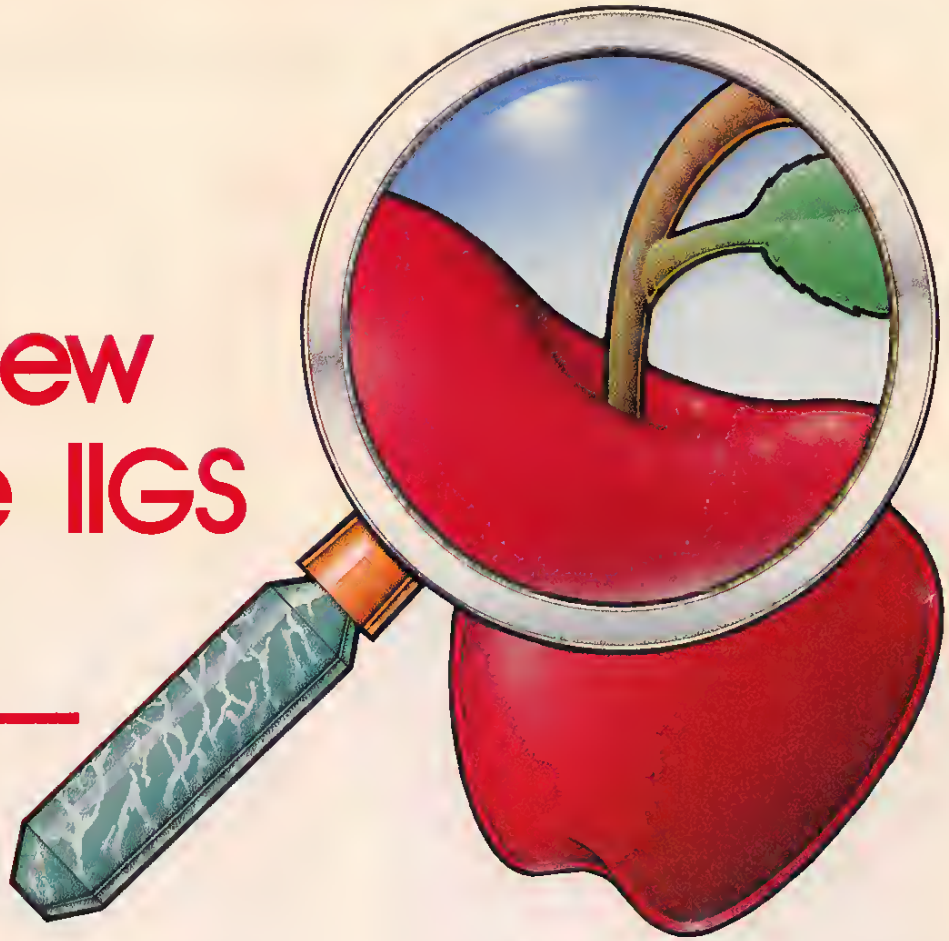
The New Apple IIGS

David D Thornburg
Associate Editor



Apple's new IIGS computer is the latest—and strongest—addition to the company's "Apple II Forever" campaign. Completely compatible with earlier Apple IIs, the IIGS offers exceptional advances in both graphics and sound (hence, GS). With a new 16-bit microprocessor, 256K of RAM, and plenty of peripheral ports, the IIGS redefines the Apple II series in some amazing ways—and IIe owners can easily upgrade their machines to the IIGS.

COMPUTE! *Associate Editor David Thornburg has had a hands-on preview of the new Apple IIGS, and filed this report. Because of the importance of the IIGS, COMPUTE! Publications is running this article concurrently in* COMPUTE! *magazine and* COMPUTE!'s Apple Applications Special.

It happens whenever a new computer hits the market. In a matter of weeks, sometimes days, you start to hear two criticisms.

It doesn't use the latest technology. That means the computer is compatible with earlier, similar machines. You heard this when computers like the Apple IIc, Commodore 128, and IBM PCjr were released.

There's no software for the computer. A bit harder to decipher, this means the machine uses some or all of the latest technology. The Macintosh, Commodore Amiga, and Atari ST fit this one.

Seems like a no-win situation, doesn't it? It was, until now.

Apple's recent announcement of the Apple IIGS, the latest addition to its original line, puts both those criticisms to rest. The IIGS is first and foremost an Apple II, and as such it runs nearly *all* of the Apple II software on the market today. Yet it's also a new computer that has its own advanced modes of operation—some of which eclipse the Macintosh in performance.

In short, the Apple IIGS is two machines in one—a product that bridges the gap between the Macintosh and Apple IIe, and in so doing poses what may be serious competition for the Commodore Amiga and the Atari ST series.

The Newest Apple

GS stands for *Graphics* and *Sound*—areas where this computer is most noticeably different from its other Apple II namesakes.

Anyone who's worked with the older II-series machines has had to contend with relatively primitive graphics and sound—capabilities that are a nostalgic remnant of 1970's technology. For instance, if two areas of the hi-res graphics

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screen were to be shaded with different colors, you had to be careful that the colors didn't "bleed." This further restricted an already small palette of colors, and made the Apple II pale in comparison to the eight-bit Atari and Commodore computers.

The built-in sound of the original II was even worse. There was only a speaker which could be "clicked" on and off by addressing a memory location. That some developers were able to create speech synthesis as well as music through this primitive port is miraculous. More modern designs, like those in the Atari and Commodore machines, provide dedicated sound processors that offer users control over the waveforms and envelopes of multivoice music.

In graphics and sound, Apple had a lot to overcome.

The Apple IIGS computer, shown here with the AppleColor RGB monitor and 5¼-inch drive, features 256K of RAM, high-resolution graphics, high-quality sound synthesis capabilities, and complete compatibility with existing Apple II software.

A Tremendous Choice Of Colors

The gap between the original Apple II and the competition grew wider and wider. Apple, after all, has sold the II in one permutation or another for nearly ten years.

The release of the IIGS does nothing to narrow the gap—it's just as wide as it ever was. Now, though, it's much of the competition that's lagging behind Apple.

The IIGS graphics capabilities offer all the original Apple II modes (to retain compatibility with existing software), as well as two new modes that promise to dominate the time and enthusiasm of software developers. These include a 320 × 200–pixel display mode that supports up to 16 different colors per scan line and a 640 × 200–pixel mode that supports 4 colors per scan line.

While these modes may not appear to be that much different from the original Apple II hi-res and double-hi-res modes, they are as different as night and day. The difference comes not so much from resolution (although that has improved) as from the fact that the color choices are picked from a palette of 256 hues, each of which has 16 luminance (or brightness) levels. This gives you access to 4096 colors in all—a tremendous choice.

Apple also announced an analog RGB monitor that shows these colors in their best light. There are no restrictions on color placement. Color bleeding is gone forever.

The purity of the IIGS color display has to be seen to be appreciated. Apple chose to use a noninterlaced screen and the resultant picture is very easy on the eyes.

One side effect of the 16 luminance levels is the ability of the IIGS to display monochrome pictures with a true grey scale, rather than using halftoning techniques that trade off grey levels for resolution. As a result, digitized photographs look much better on the IIGS screen than they do on the Macintosh, where each pixel is either "on" or "off," black or white.

Of course, the independent control of hue and luminance is not new to the personal computer industry—Atari was (to my knowledge) the first to introduce this scheme to personal computers.

An Ensoniq Sound Chip

If the IIGS graphics capabilities are good, the machine's sound capabilities are in a class by themselves. Rather than work with the (by now) ho-hum sound chips that provide simple ADSR (Attack, Decay, Sustain, Release) envelopes on sounds made from a small set of basic waveforms, the IIGS uses a custom 32-oscillator chip from Ensoniq similar to the one used in the $1700 Mirage synthesizer. This chip is capable of generating 15 voices of music, allows excellent speech synthesis, accurately reproduces sampled sounds, and is provided with its own 64K of RAM so that music can be played in a background mode while other programs are running.

This chip alone justifies the price of the IIGS to many music fans and fanatics.

All This With A 6502?

One of the reasons that the 68000-based computers like the Macintosh, Atari ST, and Amiga have become so popular is because the older eight-bit chips were running out of steam—especially when programmers wanted to create new user interfaces.

The designers of the IIGS knew the 6502 and its slightly bigger brother, the 65C02, were inadequate for the task, but they wanted to maintain compatibility with the massive amount of available software on the market. The solution was to use the 65C816—a 16-bit processor that can emulate a 6502. The 65C816 forms the heart and brains of the IIGS and, like the Roman god, Janus, looks backward—to the days of the 6502—and forward—to capabilities that go beyond the limits of the 8-bit world.

As a result, IIGS not only runs existing Apple II software, but it is

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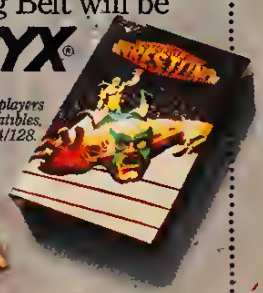

One to eight players Apple II & compatibles, Atari ST, C64/128.

also capable of supporting the various user-interface tools (like menus, windows, and icons) that have made the Macintosh so popular.

Easily Upgrade Your IIe

Lift the hood on the IIGS and you're treated to a view of a circuit board identical in size to the one inside the Apple IIe. This lets Apple offer a special upgrade for IIe owners. For a modest price you can take your IIe to your dealer and upgrade to a IIGS. Only the power supply, case, and keyboard are retained—the circuit board and basepan are replaced.

A closer look at the circuit board reveals a familiar set of seven peripheral card slots that accept the same plug-in cards used by the Apple IIe. But unless you have a lot of old cards lying around, you probably won't have to use any of these slots.

That's because the back panel already features a game/joystick port, a disk drive port (which accommodates up to six drives in either the 5¼-inch or 3½-inch format), two serial ports (including support for the AppleTalk network), composite video out, audio out, and the analog RGB video output. The remaining back panel port is the Apple DeskTop Bus—up to 16 keyboards and mice may be connected via this bus. (The IIGS is the first computer in the II line to be shipped with a mouse.) Expect to see a lot of interesting peripherals on the market that take advantage of this DeskTop Bus.

The circuit board contains 256K of RAM that can be expanded (through a built-in connector) to eight megabytes. The on-board 128K ROM can be expanded to one megabyte, another indication of the possible third-party support for this computer.

Several custom chips fill out most of the remaining real estate on the IIGS's circuit board. One of the most interesting is the "Mega II"—a chip effectively duplicating an entire Apple IIe or IIc. Don't be surprised to see this chip used to create a three- or four-chip Apple IIc someday soon.

Sound, graphics, and the Apple DeskTop Bus are each controlled with dedicated chips, shifting the burden from the micro-

Software Support

While Apple Computer may not have announced any programs specifically designed for the Apple IIGS, the company has gone out of its way to support the development of programs by third-party vendors.

Apple's position is easy to understand. In the first place, the IIGS runs existing Apple II applications and runs them at three times their normal speed. This alone breathes new life into old products and relieves some of the pressure for creating software to justify the purchase of a new computer. At the same time, Apple wants to be sure that people know that the IIGS is more than a very fast IIe—that it has many features of its own which justify the creation of new programs. Rather than dilute internal programming efforts to create one or two special programs, Apple has seeded many developers with systems on which to create programs of their own.

More than 40 companies have announced, or will announce, products specifically geared to the Apple IIGS. Some of these companies are familiar names (Brøderbund, Electronic Arts, Scholastic, and so on), while others are relative newcomers to the field. Because the IIGS supports both the Apple II environment and also supports the Macintosh style of programming, the list of developers includes names well known to Macintosh users as well as to owners of the Apple IIs.

The Development Path

Those developers who started early on the IIGS had to make use of the *ORCA Assembler* and frequent upgrades of the system software. High-level languages (like C) were made available late in the product-design cycle. This presented challenges to developers, some of whom took advantage of their prior experience to leapfrog their way through what would otherwise be a very tedious development process. Typifying this latter approach is Electronic Arts, a company known for an assortment of creativity software that is seen on almost every Amiga computer ever sold. From its beginning, Electronic Arts was committed to creating software with high-level languages such as C. The company's goal was to be as machine-independent as possible, thus simplifying the porting process to new machines (like the IIGS). As a result, Electronic Arts has converted (or will convert) its stellar Amiga programs to the IIGS and thus take advantage of the rich colors and sound available from this newest addition to the Apple family tree. According to Electronic Arts president, Trip Hawkins, the company has developed more high-level language programs for the 68000 than anyone else. The task of converting these programs to run on the IIGS is a lot easier than designing programs from scratch. Upwards of 25 programs for this computer are in development by this one company alone.

Desktop Publishing

Brøderbund has virtually defined the home desktop-publishing market with its popular program, *The Print Shop*. A new version of this program, along with a host of other products, could help cement Brøderbund's reputation as a premier supplier of home-based productivity software.

Education

The education market for the IIGS is probably going to take some time to develop, simply because of the limited budgets of most schools and their reluctance to part with their present computers. But Apple's upgrade policy to convert IIe's to IIGS's will help. In the meantime, companies well known for their interest in this market are actively developing programs for this computer. Among these are such familiar names as Scholastic, Spinnaker, and Tom Snyder Productions.

The Buyer's Guide

The companies listed in this article are but a few of many firms who are creating programs specifically for the Apple IIGS. The next few months will be accompanied by a flurry of activity as others jump on the bandwagon for this computer.

The programs for this new computer will open a new world of computing for us, and it's most heartening to see so many developers quickly moving to support it.

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The AppleColor RGB monitor has a 12-inch screen with a resolution of 640 × 200 pixels. When used with the Apple IIGS computer, the monitor is capable of displaying graphics and text in as many as 4096 colors.

processor. The result is a computer that provides tremendous room for software development.

Turbo II

The IIGS clock runs at 2.8 MHz, almost three times the speed of the Apple IIe. As a result, programs designed for the older II-series machines run at close to three times their normal speed. This is an advantage for some programs, but not for others. Most players would be truly hard-pressed to set new records if games ran at three times their normal speed. To compensate, you can set the computer's speed to the "old" value with the IIGS's on-screen control panel. Games written for the IIe or IIc will then play at the correct speed.

The control panel also lets you set the color of the text and the background, as well as the pitch and volume of the internal "beep." Again, while this kind of control is familiar to owners of Atari and Commodore computers, it's a welcome addition to the Apple II line.

What About Software?

At the time of this writing well over one hundred outside developers were actively engaged in creating software for the IIGS. By the time you read this, the number is probably triple that, with new entries being announced every day.

Apple itself, however, is conspicuous in its absence from these announcements. The company appears to be content to provide support for outside developers rather than dedicating its resources in aggressively developing its own programs for the IIGS.

There's good reason for this approach. Unlike the Macintosh—a computer released with no immediate third-party software support—the IIGS runs the vast library of Apple II programs. The IIGS is a machine that you can use from the moment you unpack it and set it up. As new products are developed to take advantage of the IIGS, people will move away from the pure Apple II software and toward the newer titles with their improved performance.

David Thornburg is an associate editor with COMPUTE! *magazine, a frequent contributor to other publications, and the designer of* Calliope*—an idea processor for the Apple IIe, IIc, the Macintosh, and now the IIGS. He may be reached in care of this publication.*

The GS At A Glance

Memory

256K RAM
  Expandable to 8 megabytes
128K ROM
  Expandable to 1 megabyte

Graphics Modes

40 × 48 (Apple IIe/c low-res)
  16 colors per scan line
280 × 192 (Apple IIe/c hi-res)
  6 colors per scan line
560 × 192 (Apple IIe/c double-hi-res) 16 colors per scan line
320 × 200 pixels
  16 colors per scan line
640 × 200 pixels
  4 colors per scan line

Colors

40 × 48 (Apple IIe/c low-res)
  16 colors
280 × 192 (Apple IIe/c hi-res)
  6 colors
320 × 200
  4096 (256 hues, 16 luminances)
640 × 200
  4096 (256 hues, 16 luminances)

Sound

32-oscillator Ensoniq chip
  15 voices
  Speech synthesis
  Reproduces sample sound
  Dedicated 64K of RAM

Microprocessor

65C816
  16-bit processor
  Clock speed—2.8 megahertz
  Emulates 6502 for Apple IIe/c compatibility

Ports

Game/joystick port
Disk drive port
  Accommodates up to six 5¼-inch or 3½-inch drives
Two serial ports
  Support for AppleTalk
Composite video out
Audio out
Analog RGB video out
Apple DeskTop Bus
  Connects up to 16 keyboards and mice

Slots

Seven peripheral card slots

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Cutting Telecommunications Costs

Kathy Yakal, Assistant Features Editor

Learning to keep your telecommunications costs as low as possible is one of the secrets of online success. Here are a few tips to help you conserve your money while still enjoying the pleasures of telecomputing.

There's probably no other personal computer application that can be as costly overall as telecommunications. The initial costs are low: a modem, a cable, perhaps, and terminal software. And if you limit yourself to calling local electronic bulletin board systems (BBSs), your expenses can end there.

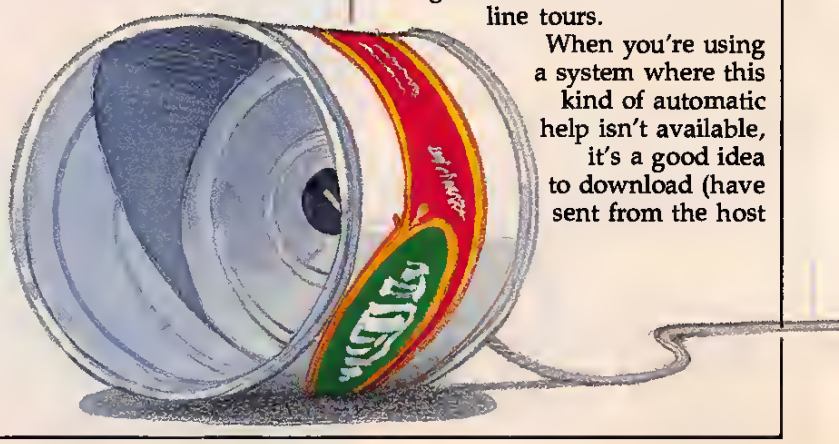
An Exciting And Varied World

But it's a rare computer owner who can resist moving out to explore the exciting and varied world of telecommunications. Your first taste of online activity usually leads to the desire to find out what's happening online across the country. So you start calling out-of-state BBSs, and maybe subscribe to an online service or two. Soon, you're facing startup subscription fees, monthly service and hourly online charges, and steadily climbing telephone bills.

However, there are ways to economize online.

• *Familiarize yourself thoroughly with whatever system you're on before attempting to accomplish anything there.* Obviously, familiarizing yourself with the system is accomplishing something, but don't even attempt extensive online chatting before you understand the command system and menu structures. Fortunately, most systems offer a lot of help in this area, and encourage the user to spend some time getting acquainted. For example, the Delphi telecommunications system requires each new user to go on an online tour at the first sign-on. QuantumLink, a Commodore-specific service, offers guided tours to new users at regularly scheduled times. In fact, most of the major telecommunications networks attempt some sort of introductory orientation for new users, whether it's through written instructions or online tours.

When you're using a system where this kind of automatic help isn't available, it's a good idea to download (have sent from the host



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Available for the Apple IIE/IIC, Macintosh, IBM PC/XT/AT and compatibles. The MACH IV for the IBM PC/XT and AT is a direct replacement for the PC Mouse from Mouse Systems, and is available with Designer Pop-up™ Menus for use with: Lotus 1, 2, 3, Multiplan, VisiCalc, FlashCalc, SuperCalc, WordStar, Multimate, Volkswriter, Personal Editor, PFS Write, DBASE II, Framework and Symphony. There is even a Microsoft Mouse driver. This means the MACH IV will work with hundreds of programs that support either a Mouse Systems' or Microsoft mouse.

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MACH IV	Macintosh (works as a mouse only)	$ 89.95
MACH IV	for IBM PC/XT/AT and compatibles	$119.95
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computer to your disk drive) Help menus (usually accessed by typing H or a question mark symbol at a command prompt), and later print them out and study them offline (disconnected from the host) until you know them well.

These menus often contain detailed explanations of each command, and give you a good idea of the quickest, easiest ways to get around the system. It may seem a lot of trouble, but learning them will save enormous frustration, time, and money. The system operators (sysops) at each network are usually available if you really get stuck, and most are quite happy to help. But remember, if you're trying to get help while online, you're generally paying for the connect time.

• *Once you've learned a system fairly well, consider using its Expert mode.* Most systems, and even many BBSs, offer a mode for experienced users that allows them to bypass many of the menus and go straight to the desired area. You need to be sure you know your way around well before you start using this, or you could find yourself locked out of the menu structure and unable to go anywhere.

Switch To A Faster Modem

• *If you do a lot of downloading, seriously consider getting a 1200-baud modem.* While 300 baud is a good speed for socializing, it can be frustratingly slow when you simply want to download a program into your computer. At the same time, 1200-baud is often too fast for chatting, if several people are participating online. There's no simple formula to help you determine whether or not the savings from fast downloads will justify the expense of a 1200-baud modem. While it's true that you're getting the information four times faster, most systems have a higher hourly charge for 1200-baud use. In the long run, however, computer users who opt for 1200-baud service generally don't choose to return to 300-baud.

• *Speed up your log-on time by using a more sophisticated terminal program.* Many terminal programs let you create macros, small user-definable routines that set up an automatic log-on procedure. If there is one area where you always go first, or one task you always perform (such as checking mail), you can add that to the macro and save some time and keystrokes. Here again, the savings may or may not be worth the extra expense of a new terminal program. But the extra convenience may play a part in your decision.

Use Off Hours

• *Try to confine the bulk of your downloading to times when the system is relatively quiet.* Systems that operate on a 24-hour basis charge lower rates for off-peak hours (evenings and weekends), thus offering substantial savings. But even off-peak hours are busier at some times than at others, usually from about 8:00 until 11:00 in the evening. At those times, a system sometimes suffers from short delays, pauses between the time you type commands and the time they're executed. You'll save some money if you steer clear of those hours.

If telecommunications at off-peak hours, such as 2:00 in the morning, is impossible, there are programs that will automatically log you on to a system at a specified hour, do the tasks you've assigned them, and log you off when they've finished. This doesn't necessarily require you to leave your computer on all night. If your computer can be set to boot up automatically when the power comes on, you can leave your disk in the drive and get an automatic timer that will turn the computer on and off at predetermined hours.

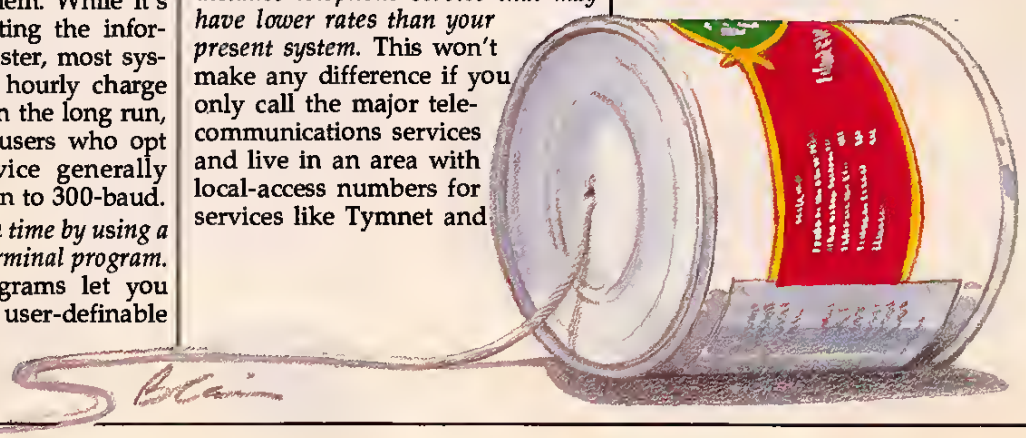
Don't Edit Online

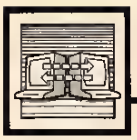
• *Consider shopping for a new long distance telephone service that may have lower rates than your present system.* This won't make any difference if you only call the major telecommunications services and live in an area with local-access numbers for services like Tymnet and Telenet, which act as connectors to the telecommunications services. But if you're calling a lot of BBSs long distance, you might be able to reap some fairly significant savings if you switch to a more economical long-distance service.

• *If you're downloading messages at 1200-baud, dump all of them to disk and search through them later.* Searching through messages and deciding which ones you want to keep can be quite time-consuming. If you're at 1200-baud, it might actually save online charges to dump a whole group of messages without stopping to read them and deciding which to save and which to discard. After you've logged off, you can go through the file and keep only the ones you want.

• *Set an alarm clock next to your computer.* This may sound rather silly, but it's easy to lose track of time when you're online, especially in your first few weeks of telecomputing. Even if you don't feel you need to set absolute limits for yourself, it will alert you as to when a set period of time has gone by. Some terminal software includes an alarm clock function.

There are no hard and fast rules when it comes to saving money online. The more experience you get in telecomputing, the more efficient you'll become. You'll also find that all of the telecommunications networks are trying to offer ways to increase their subscriber base and their percentage of online usage. As a part of this effort, rates are getting less expensive, systems are becoming easier and faster to use, and there are more services being offered within each network. Increasingly, the happy result is more telecomputing for the money. ©





Telecomputing Today

Arlan R. Levitan

The SIG Wars

It started in earnest when newcomer People Link became the first service to use the electronic-mail facilities and SIG message boards of its competitors to solicit new subscribers. While some telecomputing buffs appreciated both the irony and cleverness of this approach, People Link's competitors were not amused. CompuServe even amended its user agreement to specifically forbid solicitation of its customers by its competitors. The CompuServe user-ID of anyone sending such messages will be subject to revocation.

The People Link response was to take advantage of the ability of MCI's electronic mail to "gateway" to CompuServe's E-mail system. CompuServe was effectively checkmated since the only way to stop the unwanted message flow would be to shut off all messages using the MCI/CompuServe connection.

Since that time, things have been steadily heating up in a series of online border clashes. One of the most popular services offered by the commercial services is Special Interest Groups (SIGs), areas where like-minded users can exchange messages, chat online, and access public domain programs. A high-quality public domain program library is almost essential to the survival and financial viability of a SIG. The SIGs are minded by system operators (sysops) who receive a share of the connect-time charges racked up by SIG users.

Whose Software?

About a year or so ago, some of the sysops who ran Special Interest Groups (SIGs) on CompuServe left to set up shop on other services. While most of the defecting sysops built their new libraries from private and user-group sources, some acquired a substantial portion of their alma mater's library and used it as a base to build on. To this day, it's common to see a lot of public domain material move freely between services. In an effort to expand their public domain libraries, GEnie eliminated connect-time charges for uploading programs early this year. Within a few months almost every other information service followed suit.

Even purveyors of popular "shareware" have begun to form liaisons with commercial services. In return for a percentage of the download charges, the shareware author grants an information service semi-exclusive distribution rights for a month or so. The early availability of new releases acts as a drawing card for new users.

The most recent spate of SIG controversy concerned a user (whose name we will change, in the tradition of "Dragnet," to "Dash") of a SIG on Delphi. Dash, a talented programmer, developed a great public domain terminal program for the Amiga called "Dashterm." When offered a lucrative sysop position on CompuServe, Dash accepted. Dash also modified his terminal program to include a notice that it was available only via CompuServe and could not be uploaded to other services or otherwise distributed. This made perfect sense to Dash since he would get a "cut" of the connect-time charges used to acquire his program. Dash's old crowd on Delphi strongly objected. Many who felt that they had helped find flaws in—or made suggestions that had improved—Dashterm felt that they were being given short shrift.

Enter another personality we'll call "Lear." Lear has been maintaining a set of public domain programs for the Amiga on disk, which he distributes to the public for a nominal media and copying charge. Lear asked Dash if his modification meant that Lear couldn't include Dashterm anymore in his public domain library. Dash replied that it could not be included, which Lear really didn't have any problem with. Lear was then informed by CompuServe that he is prohibited by the terms of the CIS User agreement from distributing *any* public domain software downloaded from CompuServe.

This touched off a tidal wave of messages within the SIGs of almost every commercial service. The populist argument: "If it's public domain software, there is no copyright. An information service can't claim rights to it and nobody can tell anyone what they can or can't do with such software." To be fair, there was a tendency on the part of the most vocal proponents of free exchange to characterize CIS as the Dark Side of the Force.

The Information Police Are At The Door

CompuServe's argument was simply that redistributing material from CIS in any form was contrary to the CompuServe user agreement. This includes giving a copy to a friend, uploading it to another service, or submitting it to a user-group library.

What's the bottom line of all this nonsense? As the legal eagles who joined in the online debate noted, CompuServe was within its rights. It's hard for any service not to be, since they all reserve the right to make any changes they deem necessary to their user agreements. The barristers also noted that attempting to enforce such "shrink-wrap license" policies is almost impossible...wait a minute—there's the doorbell; I gotta go. My wife says the information police want to ask me a few questions.

(Editor's note: For CompuServe's view on these topics, see "CompuServe and Public Domain" on the next page.) ©

CompuServe and Public Domain

Selby Bateman, Features Editor

(Editor's note: See "Telecomputing Today" on the previous page before reading this article.)

Philosophical differences have long existed between those computer users who favor free access to software and those software producers and distributors who see computer programs solely as a commercial market. Between those two points of view, however, lies a great deal of territory relating to software ownership, access, and distribution.

One of the most recent and heated debates, as noted in this month's "Telecomputing Today" column, concerns the question of free access to public domain software and a telecommunications service's right to control distribution of the programs and information it provides to its members.

A Bum Rap?

While some telecomputing enthusiasts have recently fired salvos at CompuServe for limiting distribution of the public domain programs it carries, the CompuServe organization believes it's getting a bum rap. CompuServe officials say their policies—including the user agreement copyright of all material on the service—are a positive, contributing force in the distribution of public domain software.

What CompuServe wants to protect, says Rich Baker, director of corporate communications for CompuServe, is its members' rights as well as the programs and information on the system. CompuServe's user agreement copyright notice does say that the information and programs there are for the express purpose and use of the owner of a CompuServe identification number. That means no copies of any public domain software can be made legally for distribution without prior written permission from CompuServe, he says.

"The purpose of the [CompuServe] copyright is to protect the work that is on the CompuServe Information Service. That is for the benefit of our customers, so that if someone does indeed download some of the material and resells it for commercial gain, there's some recourse that can be taken to protect our customers. That's the whole purpose of the copyright.

"From that has spun off a number of opinions, some that I think are inaccurate," he adds. "As it relates to public domain software, we encourage very much the use of CompuServe to post public domain software.

"First, we make a tremendous amount of storage available to hold those kinds of programs. Second, we turn off the clock for people who are uploading the programs to us now. So it doesn't cost them anything to upload the programs. And third, we actually publish an electronic—and soon to be printed—column that's called 'The Best of the Uploads.' We work with our system administrators and a freelance writer to collectively take a look at the software that's been uploaded, and some of the more popular ones. Then we'll write about them and bring them to our customers' attention so that they can use them, too. So, we really encourage the use of public domain software an awful lot on our system."

Encouraging Public Domain Software

One recent article in a Southwestern newspaper claimed that CompuServe's copyright rules were, in effect, a claim of ownership of public domain software, says Baker.

"It was quoted there that our policy evades the spirit of public domain, and I took real exception to that because it really doesn't. Everything we do encourages the public domain software concept, everything from our free uploads to the fact that we publicize the good programs for our customers.

"It can easily be summarized by saying that the copyright is instituted as a measure of protection, not necessarily as a measure of ownership. And it's something we feel is important for the feeling that our customers have that they can use our service, and what goes on there is protected and is in their best interests," he says.

Is such a copyright enforceable? Baker admits that, to his knowledge, no one has challenged the legality of the user agreement and the copyright.

"I think once people understand the intent, they don't have a problem with it. And the term copyright—you know, this is just such a different medium. We're applying rules, laws, procedures from different media onto this new medium. And therefore, in many ways, the opportunity for misinterpretation might be a little bit greater. But our goal is to continue to educate people and help everybody understand what it is the medium has to offer—and the rights that people have to the information and the rights that the people have who supply the information. It's a continuing process."

For those members of CompuServe who may wish to distribute copies of downloaded software, Baker says there is a procedure. "It's just like any other copyright. They would make application in writing to us, and we would review it and respond in writing with permission or denial.

"We look at every situation as a unique situation. And we follow pretty much the guidelines that are a part of the copyright policy. With very few exceptions, permission is granted," adds Baker. "It very heavily reflects on whether it's a program or whether it's information. It really reflects on how it's going to be used." ©

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ONLINE UPDATE

Selby Bateman, Features Editor

If you're new to telecomputing, or haven't been online for a while, you'll find some pleasant surprises. The major telecommunications services have continued to add new features and to make their systems easier to use. Here's an overview of some of the newest resources at your telecommunications doorstep.

One of the most rapidly evolving segments of the ever-changing personal computer field is telecommunications, connecting your computer to other computers through telephone lines. All you really need in order to get started is your computer, a *modem* that translates your computer's signals into tones that can be transmitted via telephone lines, and a terminal program that coordinates the actual transmissions.

Once you begin telecomputing, you quickly find that among the most interesting and varied online pursuits are the different telecommunications services that offer you hundreds of different activities and access to thousands of computer users.

Individual services vary quite a bit, depending on what kind of computer user each is hoping to attract. Some services cater to business customers, but a growing number are trying to interest home computer users. The major consumer services listed below don't include all of the systems you're likely to run into. But, they have become the best-known major services among personal computer owners.

American People/Link

It's been almost two years now since American People/Link went online with its combination of news, entertainment, conversation, electronic mail, CB simulation, and games. Among its variety of online clubs, the Commodore Club continues to be one of the most popular areas of use.

People/Link users are called *Plinkers*, and the emphasis is on interaction among members, ease of use, and low cost. Users receive regular printed information updates called *LinkLetters*. There is a Help system for beginners, as well as Advanced Mode, which lets more experienced members move around more quickly.

American Home Network, 3215 N. Frontage Rd., Suite 1505, Arlington Heights, IL 60004; 800-524-0100 (Illinois residents call 312-870-5200); non–prime time access rate is $4.25 per hour at 300 baud and $4.95 an hour at 1200 baud; prime time fees are $11.95 for 300 baud and $12.65 for 1200 baud. (Illinois residents pay $4.25 at all times.)

CompuServe Information Service

CompuServe remains the nation's largest computerized consumer information service, and continues to add to its huge library of online offerings. The financial services area, in particular, has undergone extensive growth. Three brokerage services are offered for online transactions, and Wall Street financial information from 1973 forward is available.

One of the new financial services offered on CompuServe is COSCREEN, which lets investors screen information about companies through as many as 24 different search variables.

In addition, CompuServe has added greatly to its database library through the IQuest gateway link. An additional 700 databases have been added to the approximately 400 already available on CompuServe. The new databases are primarily in the reference and bibliographical areas for such professional fields as health, law, real estate, and many others. The new databases also include many national and regional newspaper files, as well as adding the UPI (United Press International) news wire. CompuServe already offers the AP (Associated Press) service.

Another service area undergoing major growth is the expanded travel information and transactions section. Using the Online Airlines Guide (OAG), you can book your own reservations anytime and anywhere. There's even a ski reservations service called the Rocky Mountain Connection that lets you schedule an entire ski weekend or extended ski trip.

The popularity of CB-style communication has led to a new digitized database of users' photos. Send in a photo of yourself to CompuServe, and the company will digitize the photo for free and include it in a database of all members who send them in. So, if you've been chatting online and made a new friend, you can call up the name of the person and see a digitized picture on your screen. This service is an offshoot of CompuServe's earlier digitizing of photos of the FBI's ten most wanted criminals.

CompuServe, P.O. Box 20212, Columbus, OH 43220; 800-848-8199; $39.95 registration fee; prime time access is $12.50 an hour at 300 baud and $15 an hour at 1200 baud, with non-prime time rates of $6 an hour at 300 baud and $12.50 an hour at 1200 baud.

Delphi

Delphi has added a variety of new services to its offerings, including Computer Express, an interactive shopping service that offers computer software and accessories at discount prices. Ordering is quite simple: If you see something of interest while browsing, you type the letter *O*. Information on that item is stored in a personal file, which is called up when you enter the command to exit. At that time, you can either cancel the order or place it.

Another new service is a classified advertising section, which allows you to receive responses to your own classified ads either via Delphi mail or through mail/telephone orders.

For those visiting the Boston area, Delphi Boston is a special online service offering hotel and restaurant guides, sports schedules, and other information of interest to residents of and visitors to the area. There's also an expanded travel service on Delphi now, which allows you to shop online for the best airline rates and schedules and make your own reservations.

A new magazine and book order area lets you subscribe to various publications and even change mailing addresses online. In addition, you can correspond with the editorial staffs of participating publications.

Delphi, 3 Blackstone Court, Cambridge, MA 02139; 800-544-4005; $49.95 registration fee; prime time access is $17.40 an hour and non-prime time access is $7.20 an hour.

Dow Jones News/Retrieval

Dow Jones is considered the premier business and financial computer news service, and its databases carry extensive financial and stock market data as well as a growing array of other news and information.

Over the past several years, the subject areas included have broadened into many other areas. As with the other major services, users can find everything from general-interest news, weather, and sports to airline guides, college selection services, and an online encyclopedia. As with CompuServe, the number and variety of offerings are huge.

Dow Jones News/Retrieval, P.O. Box 300, Princeton, NJ 08540; 800-257-5114; $29.95 registration fee, which gives you five free hours; $12 annual service fee that's waived the first year. At 300 baud, prime time access fee is 90 cents per minute, and non-prime time rates are 20 cents a minute. At 1200 baud, rates are 2.2 times those at 300 baud. In addition, about 8 of the 40 online databases carry a surcharge.

GEnie

After only a year of operation, GEnie has developed a subscriber base of over 20,000, and plans to have 30,000 by the end of 1986.

Some of the newer services include the American Airlines Easy Sabre Travel Service, which lets you peruse fares and schedules, and make reservations online; 25 new SIGs (Special Interest Groups), ranging from computer-related areas to science fiction/fantasy to scuba diving; Hollywood Hotline, a database of movie reviews, both current and as old as 10–15 years; and suspension of the $5/hour surcharge while public domain software is being uploaded. Of the approximately 10,000 data files available on GEnie, 75 percent come from users.

General Electric Information Services, 401 N. Washington St., Rockville, MD 20850; 800-638-9636, ext. 21; $18 registration fee; prime time access is $35 an hour, and non-prime time access is $5 an hour.

QuantumLink

In its first year of operation, this Commodore 64/128-specific service has received quite a bit of interest. Several months ago, new software for the system was released, adding features such as a new downloading mechanism that speeds up downloads anywhere from 20 to 60 percent; a status report during downloads that tells how much of the download has been completed as you go along; reorganization of the software libraries, making it easier to find programs; an overhaul of the message boards for easier use; and an autoboot program for Commodore 128 users, as well as an auto-redial capability.

QuantumLink Customer Service, 8620 Westwood Center Drive, Vienna, VA 22180; 800-392-8200; no registration fee; $9.95 monthly charge (no additional charges except for certain selected services at six cents a minute).

The Source

The Source continues to add services for both consumers and business users. Among the new services are SIGs, including those for Commodore, Apple, and IBM computers. Like other telecommunications services that offer SIGs, The Source offers messaging capabilities, public domain software for downloading, E-Mail, and a variety of other areas of interest to personal computer owners.

There's also a new service called *USA Today Broadcast*. This is a special feature offered to those employed in the field of broadcasting. Gannett, publisher of *USA Today*, makes editorial content available online prior to printing the actual publication.

The Source, 1616 Anderson Road, McLean, VA 22102; 800-336-3366; $49.95 registration fee, which includes 300-page manual. Billing is $10 a month or your usage, whichever is greater. At 300 baud, prime time access is 36 cents a minute and non-prime time is 14 cents a minute; at 1200 baud, prime time rate is 43 cents per minute and non-prime time is 18 cents a minute. ©

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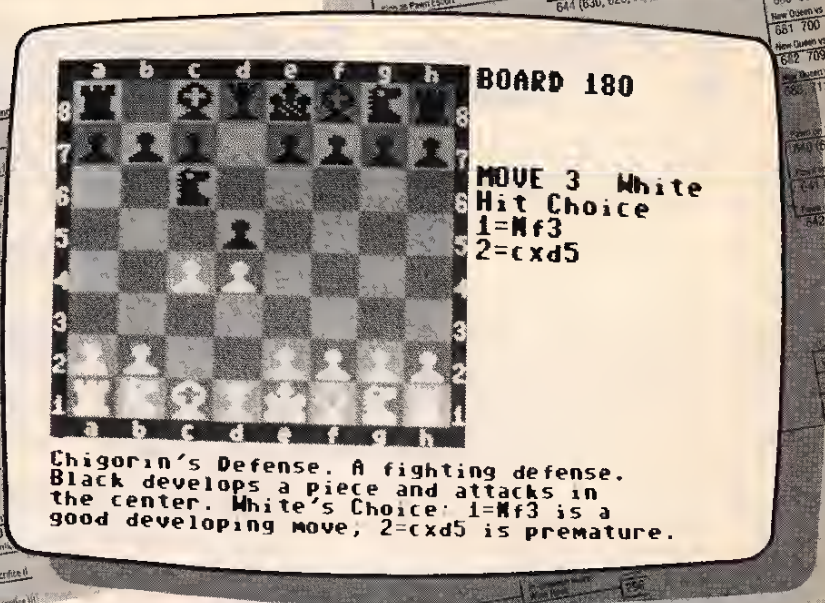

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- Bird's Opening
- Larsen Attack
- Sokolsky's Opening
- Benko's Opening
- Grob's Attack
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- Benoni Defense
- Nimzo-Indian
- Queen's Indian
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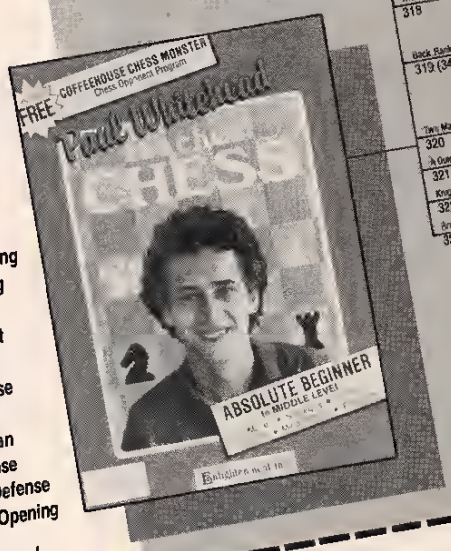

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X*Press Information Service

The Cable TV And Personal Computer Connection

Kathy Yakal, Assistant Features Editor

One of the benefits of computer telecommunications is that information from many different sources is instantly available. Traditionally, that process has involved using a modem and terminal software. But recently a new cable TV–based information service was introduced that offers personal computer owners immediate access to news from around the world.

X*Press Information Services of Golden, Colorado, recently began offering a new way to harness the power of satellite transmissions, combining cable television and a personal computer. This service, called X*Press, lets personal computer owners who subscribe to participating cable companies pick up general news, business news, financial information (including stock quotes from all major exchanges), weather, sports, feature articles, entertainment, and other information for a flat monthly fee. The same cables that bring in your TV programs carry this information service to your computer.

X*Press is a new approach to the efforts by various telecommunications firms to deliver everything from home banking and shopping to instant access to news and other information. Experiments in *videotex* and *teletext*, each of which brings information to your computer or television screen, have had generally limited success in attracting a mass consumer market. But X*Press, with its tie-in with cable companies, ease of use, and flat monthly fee, offers yet another potential market.

Teletext generally refers to the transmission of information to your television, computer, or a special receiver via a standard broadcast signal. On the other hand, *videotex* usually refers to a more interactive information process in which your computer talks to a company's main computer. With videotex, for example, you might be able to buy stocks and bonds, select items to purchase, and engage in other interactive pursuits.

X*Press is closer to teletext service, delivering text on a multitude of topics instantaneously.

How Does It Work?

Satellite transmissions and other data are received at the X*Press Processing Center, where the information is coded to be read by the center's computer software. From there, it's sent to a telecommunications satellite, which then transmits the information to local cable systems. The cable companies relay the data via cable lines to a subscriber's home or office computer. This information is available to subscribers at the same time the information is arriving at newspapers, radio and TV stations, and news networks.

The service works with a variety of personal computers, each with different requirements. Apple IIe and IIc subscribers will need 128K RAM and the X*Press Apple Software Module; IBM and compatible subscribers will need 256K RAM, MS-DOS version 2.0 or later, an asynchronous RS-232 port, and the X*Press IBM Software Kit; Commodore 64, 128, and Plus/4 subscribers will need only the X*Press Commodore Cartridge. Information on X*Press is transmitted on each of these systems at the highest data rate a personal computer can now accept: 9600 baud.

After your system is set up and the software loaded, moving around within the X*Press system via menus is easy. You can choose to see stories in the three categories which follow.

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Launched in January 1986, X*Press is already being used on 76 different cable television systems across the country, with approximately 1000 subscribers. Subscribers purchase X*Press through their cable service and pay a monthly fee, as with other premium pay services offered by cable television systems. They can access the information 24 hours a day, seven days a week. The suggested price for the service is $19.95/month.

*For more information, write to X*Press Information Services, 1536 Cole Blvd., Bldg. 4, Suite 250, Golden, CO 80401, or use the toll-free telephone number, 1-800-7PC NEWS.* ©

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Biker Dave

David Schwener

Here's a game guaranteed to bring out the daredevil in any computer owner. The original version of "Biker Dave" is written for Atari 400, 800, XL, and XE computers. We've added new translations for the IBM PC/PCjr, Commodore 64, and Amiga. The Commodore 64 and Atari versions require a joystick.

As the ramp nears, you focus your mind, tighten your grip on the handlebars, and accelerate the motorcycle for the final approach. The deep, throaty cry of your machine's powerful engine drowns the spectators' cheers, and the onrushing wind pushes against your body like a gigantic hand. If your speed and timing aren't exactly right, you may overshoot the ramp and lose control, or fall short into the line of cars.

Will you earn fame by surviving the jump or tumble into anonymity with a cartwheeling crash? As your speed mounts and the sidelines fade into a blur, there's no more time to wonder and no chance to turn back. Only the utmost in coordination and skill will bring you safely to earth on the other side.

"Biker Dave" is a realistic computer game that simulates the thrills and challenge of motorcycle acrobatics. Type and save the program listed for your computer, and be sure to read the general game instructions as well as the specific notes for your machine.

Over The Ramp

Biker Dave begins by asking you to select one of the two available skill levels: The rookie level is easier than the pro level. With this preliminary out of the way, the program displays the game screen. In the upper left corner of the screen is the garage where you begin the ride. The rest of the screen contains the racetrack, with a couple of tunnels along the way, and a formidable obstacle which consists of several autos flanked by launching and landing ramps. Press the joystick button to accelerate the bike. Your goal is to ride down the track, through the tunnels, and toward the final obstacle, gaining just enough speed to jump over the cars without crashing.

That may sound easy, but it's not as simple as you might think. For one thing, your bike is a specially built stunt machine with no brakes. Should you reach too high a speed, there's no way to slow down again. And if you accelerate too fast, the bike rises up into a wheelie. That's not bad in itself, but if you accelerate too hard from a wheelie position, the bike tips backwards and crashes.

As you approach the launching ramp, you need to go just fast enough to clear the parked cars, but not so fast that you lose control and miss the landing ramp on the other side. A successful jump requires precise timing and sure control of the throttle. The score you earn depends on the number of cars jumped and the number of attempts you made at that level.

Each time you jump over the cars, the racetrack crew moves the launching ramp and adds another car to the lineup. Unfortunately, the crew is somewhat unreliable and has been known to change the launching ramp's angle slightly when moving it. Thus, even though you may have jumped three cars with a speed of 100 miles per hour, there's no guarantee that the same speed will work every time.

At the pro level you must also jump a large hoop midway through the course. The hoop has a launching ramp, but no landing ramp. Each time a car is added to the final obstacle, the hoop's launching ramp moves farther away, as well.

Atari Version

This version of Biker Dave is written entirely in BASIC and runs on Atari 400, 800, XL, and XE computers. A joystick is required; plug it into port 1 before you run the program.

This program employs several techniques to compensate for the slowness of BASIC. Lines 1470–1610 position the P/M (Player/Missile) graphics at the same address as the string P0$. When a

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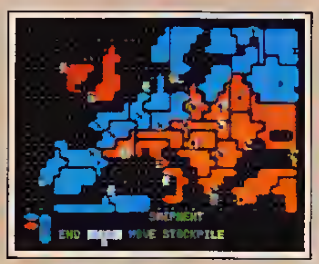

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player/missile needs to be moved or changed, this string is modified with BASIC string commands. Lines 1650–1700 read various bike images into separate strings, which are later made part of P0$. Since the ramp images don't change, they are read directly into memory.

When the bike enters or exits the garage and tunnels, it goes in front of the blue opening, but behind the yellow or green walls. Similarly, the bike jumps through the hoop by going in front of the red portion, but behind the green. Line 1710 prepares for these three-dimensional graphic effects by putting a special value in the priority register (location 623).

Although the bike travels right, left, and then right again, the program itself doesn't follow that flow. The code that performs the actual jump is located near the beginning of the program. Since lines with low line numbers run faster, this insures that the speed-critical portions of the program work as quickly as possible.

Commodore 64 Version

A joystick is required to play the 64 version of Biker Dave (Program 2), which includes a flaming hoop midway through the course. Plug the joystick into port 2 before you run the program. To accelerate the bike, hold down the joystick button. There is no rookie level in this version; the game ends when you crash your last bike or succeed in jumping nine cars at once.

IBM PC/PCjr Version

The IBM PC/PCjr version of Biker Dave (Program 3) requires cartridge BASIC for the PCjr, or BASICA and a color/graphics card for the PC. Press the space bar to accelerate the motorcycle. One skill level is provided; the game ends when you succeed in jumping nine cars at a time or run out of bikes.

Amiga Version

In this version of Biker Dave (Program 4) the left mouse button controls your speed. (Avoid the right button; pressing it may crash the program.) The game has no rookie level; it ends when you manage to jump nine cars at once or crash your last bike. You may wish to adjust the speed at which the left button responds by using the Preferences tool from the Workbench.

"Biker Dave" for Atari 400, 800, XL, and XE computers lets you vicariously experience the thrills of motorcycle acrobatics.

For instructions on entering these listings, please refer to "COMPUTE!'s Guide to Typing In Programs" in this issue of COMPUTE!.

Program 1: Biker Dave For Atari 400, 800, XL, And XE

```
KK 40  GOSUB 1410
LD 50  GOSUB 1940
KK 60  GOSUB 3100
LD 70  GOSUB 2820
DP 80  GOTO 590
FL 89  REM JUMP BIKE LEFT (PR
       O ONLY)
EP 90  P0$(68,80)=BL$
ND 100 P0$(118,128)=LEFT$
LP 110 I=I-INT(SP/50)-1:IF I
       <117+CARS*4 THEN 170
DN 120 POKE 53248,I
AE 130 SOUND 0,45-SP/10,2,8
BB 140 SP=SP+5*(STRIG(0)=0):
       POSITION 19+(SP<100)+
       (SP<10),12:? SP;
MP 150 FOR J=1 TO 250-SP*SP:
       NEXT J
GC 160 GOTO 110
JO 170 P0$(118,130)=JUMPL$:P
       OKE 53278,0
MI 180 V=((SP/10+30)*VV)*((S
       P/10+30)*VV):Y=0
NN 190 FOR I=25 TO 1000 STEP
        INT(SP/50)+1
PG 200 Y1=(-I+(16*I*I/V)):IF
        Y1>0 THEN 260
NJ 210 P0$(Y+118,Y+130)=BL$
JA 220 P0$(Y1+118,Y1+130)=JU
       MPL$:Y=Y1
BJ 230 TRAP 890:POKE 53248,(
       143+CARS*4)-I
AG 240 IF PEEK(53252)>10 THE
       N FLAG=1:GOTO 890
BP 250 NEXT I
KJ 260 IF (143+CARS*4)-I<55
       THEN FLAG=1:GOTO 890
KC 270 P0$(20,250)=BL$
DO 280 I=(143+CARS*4)-I:GOTO
        820
NN 290 P0$(118,128)=LEFT$
EE 300 I=I-INT(SP/50)-1:POKE
        53248,I
MP 310 FOR K=1 TO 250-SP*SP:
       NEXT K
BO 320 NEXT J
JN 330 GOTO 1070
FI 339 REM JUMP BIKE RIGHT
NM 340 P0$(118,128)=BL$
MP 350 P0$(182,192)=RIGHT$
NJ 360 I=I+INT(SP/50)+1:IF I
       >163-CARS*8 THEN 420
EE 370 POKE 53248,I
AL 380 SOUND 0,45-SP/10,2,8
BI 390 SP=SP+5*(STRIG(0)=0):
       POSITION 19+(SP<100)+
       (SP<10),12:? SP;
HN 400 FOR J=1 TO 250-SP*SP:
       NEXT J
BN 410 GOTO 360
NP 420 P0$(182,194)=JUMPR$
MB 430 V=((SP/10+30)*VV)*((S
       P/10+30)*VV):Y=0
ML 440 FOR I=25 TO 1000 STEP
        INT(SP/50)+1
PM 450 Y1=(-I+(16*I*I/V)):IF
        Y1>0 THEN 520
OL 460 P0$(Y+182,Y+194)=BL$
KI 470 P0$(Y1+182,Y1+194)=JU
       MPR$:Y=Y1
DA 480 POKE 53278,0
ND 490 TRAP 890:POKE 53248,I
       +142-CARS*8
NK 500 IF PEEK(53252)>1 THEN
        890
BO 510 NEXT I
JG 520 IF I+142-CARS*8>195 T
       HEN 890
KB 530 P0$(20,250)=BL$
NA 540 P0$(182,192)=RIGHT$
DH 550 FOR J=I+142-CARS*8 TO
        220:POKE 53248,J
NG 560 FOR K=1 TO 250-SP*SP:
       NEXT K
CF 570 NEXT J
JO 580 GOTO 1070
FK 589 REM MOVE BIKE RIGHT
OJ 590 FOR I=1 TO 5:POSITION
        12,8:? "G E T
       {3 SPACES}R E A D Y";
       :FOR J=1 TO 50:NEXT J
       :POSITION 12,8:? "
       {17 SPACES}";
GE 600 FOR J=1 TO 50:NEXT J:
       NEXT I:FOR I=1 TO 50:
       NEXT I
AP 610 POKE 77,0:P0$(180,192
       )=BL$
GP 620 POKE 53248,67:P0$(70,
       80)=RIGHT$
NJ 630 SP=5:STP=1:I=66
LN 640 I=I+INT(SP/50)+1:IF I
       >192 THEN GOTO 90+(PR
       O=0)*720
EF 650 POKE 53248,I
AN 660 SOUND 0,45-SP/10,2,8
BJ 670 SP=SP+5*(STRIG(0)=0):
       POSITION 19+(SP<100)+
       (SP<10),12:? SP;
NH 680 FOR J=1 TO 250-SP*SP:
       NEXT J
KN 690 IF SP>SP1 THEN 740
KE 700 IF SP>SP2 THEN 720
GL 710 GOTO 640
NP 720 P0$(68,80)=JUMPR$
GN 730 GOTO 640
NF 740 P0$(68,80)=BL$:SOUND
       0,10,4,8
AO 750 FOR K=I TO 192:POKE 7
       04,K
EJ 760 POKE 53248,K
NN 770 IF RND(0)>0.5 THEN P0
       $(72,78)=RIGHT$:GOTO
       790
IN 780 P0$(72,78)=JUMPR$
CK 790 NEXT K
ID 800 POSITION 19,12:? "000
       ";:TRIES=TRIES+1:GOTO
        980
AC 809 REM MOVE BIKE LEFT
```

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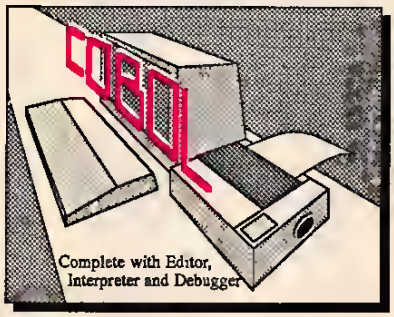

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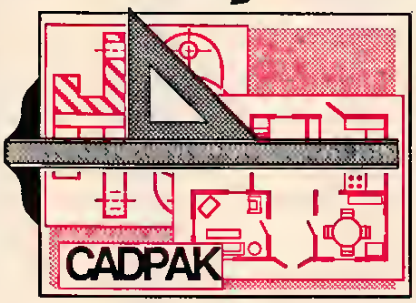

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HP 810 P0$(68,80)=8L$
HM 820 P0$(118,128)=LEFT$
QE 830 I=I-INT(SP/50)-1:IF I
       <53 THEN 340
EG 840 POKE 53248,I
AN 850 SOUND 0,45-SP/10,2,8
9K 860 SP=SP+5*(STRIG(0)=0):
       POSITION 19+(SP<100)+
       (SP<10),12:? SP;
NI 870 FOR J=1 TO 250-SP*SP:
       NEXT J
HE 880 GOTO 830
FH 889 REM CRASH SEQUENCE
IK 890 POSITION 19,12:? "000
       ";:TRIES=TRIES+1:TRAP
       980
AO 900 IF FLAG THEN 940
NF 910 P0$(160,220)=8L$
8H 920 P0$(185,190)=RIGHT$:S
       OUND 0,10,4,8
CI 930 FOR J=1+142-CARS*8 TO
       248:POKE 53248,J:POK
       E 53256,J:POKE 704,J:
       NEXT J:GOTO 980
HC 940 P0$(1,220)=8L$
LM 950 P0$(121,126)=LEFT$:SO
       UND 0,10,4,8
LE 960 FOR J=143+CARS*4-I TO
       52 STEP -1:POKE 5324
       8,J:POKE 53256,J:POKE
       704,J
FP 970 FOR K=1 TO 250-SP*SP:
       NEXT K:NEXT J:FLAG=0
BQ 980 O=PEEK(560)
JM 990 FOR I=15 TO 0 STEP -1
       :SOUND 0,25,0,I:FOR J
       =1 TO I:NEXT J:POKE 5
       60,(O-1)+RND(0)*1:NEX
       T I
AB 1000 POKE 560,O
NB 1010 BIKES=BIKES-1:IF BIK
        ES=0 THEN 1310
FO 1020 POSITION 36,13:? BIK
        ES;
CH 1030 FOR I=1 TO 50:NEXT I
HH 1040 P0$(1)=CHR$(0):P0$(2
        56)=CHR$(0):P0$(2)=P
        0$
CE 1050 POKE 704,248:POKE 53
        256,0
JO 1060 GOTO 590
HC 1069 REM GOOO JUMP SEQUEN
        CE
LO 1070 POSITION 19,12:? "00
        0";
KH 1080 SOUND 0,121,10,8:SOU
        ND 1,96,10,8:SOUND 2
        ,81,10,8:SOUND 3,60,
        10,8
BE 1090 FOR I=1 TO 2:POKE 70
        5,RND(0)*254+1:POKE
        706,RND(0)*254+1:IF
        PRO THEN POKE 707,RN
        D(0)*254+1
EK 1100 NEXT I
BI 1110 FOR I=0 TO 3:SOUND I
        ,0,0,0:NEXT I
MD 1120 REM FOR I=1 TO 3:NEX
        T I
KD 1130 SOUND 0,121,10,8:SOU
        ND 1,96,10,8:SOUND 2
        ,81,10,8:SOUND 3,60,
        10,8
EH 1140 FOR I=1 TO 20:POKE 7
        05,16*(RND(0)*15+1):
        POKE 706,16*(RND(0)*
        15+1):IF PRO THEN PO
        KE 707,16*(RND(0)*15
        +1)
EP 1150 NEXT I
BN 1160 FOR I=0 TO 3:SOUND I
        ,0,0,0:NEXT I
MK 1170 S=CARS*10-TRIES*5+5:
        IF PRO THEN S=S+S
AA 1180 FOR I=T TO T+S
LL 1190 POSITION 20,14:? I;:
        SOUND 0,I,10,12:SOUN
        O 0,0,0,0
EL 1200 NEXT I
FB 1210 T=T+S:TRIES=1
NJ 1220 POSITION 14,13:? TCA
        RS;:CARS=CARS+1:TCAR
        S=TCARS+CARS:IF CARS
        >13 THEN OONE=1:GOTO
        1310
IO 1230 VV=0.8+RND(0)*0.1
JN 1240 SP1=RND(0)*15+81+8*C
        ARS:SP2=RND(0)*10+36
        +8*CARS
OA 1250 FOR I=8 TO 0 STEP -1
        :FOR J=1 TO 15:SOUND
        0,J,10,8:NEXT J:SOU
        ND 0,0,0,0
GJ 1260 POKE 53249,I+162-CAR
        S*8:POKE 53251,108-I
        /2+CARS*4:NEXT I
EF 1270 A=INT(RND(0)*2)
JD 1280 8=(INT(RND(0)*6)*2)+
        97
IA 1290 POSITION 33-2*CARS,1
        0:? CHR$(8+128*A);CH
        R$(8+128*A+1)
JL 1300 GOTO 590
AH 1309 REM GAME OVER
LJ 1310 POKE 53277,0:GRAPHIC
        S 0:POKE 559,2:POKE
        752,1:POKE 710,98:PO
        KE 712,98:POKE 709,1
        4
NK 1320 IF OONE AND PRO THEN
        POSITION 5,5:? "Con
        sider yourself King
```

```
        8iker!!":GOTO 1350
KE 1330 IF OONE THEN POSITIO
        N 1,5:? "0reat Jumpi
        ng' Now try the PRO
        leveI.":GOTO 1350
NE 1340 POSITION 4,5:? "YOU
        HAVE WRECKED YOUR LA
        ST 8IKE!"
ND 1350 POSITION 4,8:? "YOU
        SUCCESSFULLY JUMPED
        ";TCARS-CARS;" CARS.
        "
DI 1360 POSITION 11,11:? "FI
        NAL SCORE IS ";T;
IB 1370 POSITION 5.18:? "Pre
        ss  TRIGGER  to play
         again"
NA 1380 POKE 559,34:POKE 77,
        255
NA 1390 IF STRIG(0)=1 THEN 1
        390
KA 1400 GOSUB 3100:GOSUB 282
        0:GOTO 590
II 1409 REM INITIALIZE PM8
NC 1410 OIM P0$(256),P1$(256
        ),P2$(256),P3$(256)
FJ 1420 OIM PLR(3),MOV$(28),
        A$(25)
NP 1430 OIM RIGHT$(9),LEFT$(
        9),JUMPL$(11),JUMPR$
        (11),8L$(256):8L$(1)
        =CHR$(0):8L$(256)=CH
        R$(0):8L$(2)=8L$
NP 1440 P1$(1)=CHR$(0):P1$(2
        56)=CHR$(0):P1$(2)=P
        1$
IE 1450 P2$(1)=CHR$(0):P2$(2
        56)=CHR$(0):P2$(2)=P
        2$
IJ 1460 P3$(1)=CHR$(0):P3$(2
        56)=CHR$(0):P3$(2)=P
        3$
IK 1470 RAM=PEEK(106)-16
BD 1480 POKE 54279,RAM
BK 1490 PM8ASE=256*RAM
DJ 1500 FOR I=0 TO 3
MB 1510 PLR(I)=PM8ASE+256*I+
        1024
FA 1520 NEXT I
NE 1530 POKE 106,PEEK(106)-4
        :GRAPHICS 0:CHSET=(P
        EEK(106))*256:POKE 7
        52,1:?
EA 1540 POKE 704,248:POKE 70
        5,0:POKE 706,0:POKE
        707,0:POKE 710,0:POK
        E 712,0
JL 1550 STARP=PEEK(140)+PEEK
        (141)*256
GI 1560 VVTP=PEEK(134)+PEEK(
        135)*256
PN 1570 OFFSET=PLR(0)-STARP
GL 1580 HI=INT(OFFSET/256)
PD 1590 LO=OFFSET-HI*256
GK 1600 POKE VVTP+2,LO
GC 1610 POKE VVTP+3,HI
HP 1620 P1$(1)=CHR$(0):P1$(2
        56)=CHR$(0):P1$(2)=P
        1$
IE 1630 P2$(1)=CHR$(0):P2$(2
        56)=CHR$(0):P2$(2)=P
        2$
IJ 1640 P3$(1)=CHR$(0):P3$(2
        56)=CHR$(0):P3$(2)=P
        3$
FK 1650 FOR I=1 TO 9:READ A:
        RIGHT$(I,I)=CHR$(A):
        NEXT I
AI 1660 FOR I=1 TO 9:READ A:
        LEFT$(I,I)=CHR$(A):N
        EXT I
JF 1670 FOR I=1 TO 11:READ A
        :JUMPR$(I,I)=CHR$(A)
        :NEXT I
JA 1680 FOR I=1 TO 11:READ A
        :JUMPL$(I,I)=CHR$(A)
        :NEXT I
CB 1690 FOR I=1 TO 9:READ A:
        POKE PLR(1)+I+180,A:
        NEXT I
JJ 1700 FOR I=1 TO 9:READ A:
        POKE PLR(2)+I+180,A:
        POKE PLR(3)+I+116,A:
        NEXT I
FO 1710 POKE 623,8:POKE 5325
        7,1:POKE 53258,1:POK
        E 53259,1
DK 1720 POKE 53248,1:POKE 53
        249,139:POKE 53250,1
        80:POKE 53251,120
AA 1730 POKE 559,62:POKE 532
        77,2
NA 1740 GOTO 1820
LF 1750 DATA 48,32,40,52,166
        ,255,24,211,195
MB 1760 OATA 12,4,20,44,101,
        255,24,203,195
KB 1770 OATA 48,36,39,54,44,
        59,59,248,192,48,48
IP 1780 OATA 12,36,228,108,5
        2,220,220,31,3,12,12
LB 1790 OATA 1,1,3,3,7,7,15,
        15,31
KL 1800 OATA 128,128,192,192
        ,224,224,240,240,248
PI 1809 REM TITLE SCREEN
ON 1820 A=95:POSITION 7,8:A$
        ="{3 SPACES}8 I K E
        R{3 SPACES}O A V E
        {3 SPACES}":GOSUB 18
        60
JK 1840 SOUND 0,0,0,0
KD 1850 RETURN
PB 1860 P0$(1,255)=8L$(1,255
        )

ND 1870 P0$(A,A+10)=RIGHT$
PN 1880 FOR I=30 TO 73 STEP
        2:POKE 53248,I:SOUND
        0,35,2,I/8:NEXT I:S
        OUND 0,35,2,12
NK 1890 FOR I=1 TO 25
GN 1900 FOR J=2 TO 4 STEP 2:
        POKE 53248,(I-1)*4+J
        +73:NEXT J
NL 1910 ? A$(I,I);:NEXT I
KB 1920 FOR I=174 TO 250 STE
        P 2:POKE 53248,I:SOU
        ND 0,35,2,20-I/15:NE
        XT I
KN 1930 RETURN
CF 1939 REM INITIALIZE CHARA
        CTER SET
AD 1940 POKE 756,CHSET/256
PN 1950 POSITION 12,21:? "PL
        EASE STANDBY";
LB 1960 RESTORE 2000
DC 1970 READ A:IF A=-1 THEN
        RETURN
ED 1980 FOR I=0 TO 7:READ J:
        POKE CHSET+A*8+I,J:N
        EXT I
NN 1990 GOTO 1970
PG 2000 OATA 1,0,32,32,32,32
        ,0,32,0
KK 2010 OATA 16,0,168,136,13
        6,136,136,168,0
NA 2020 OATA 17,0,32,160,32,
        32,32,168,0
FD 2030 DATA 18,0,168,8,168,
        128,128,168,0
FE 2040 OATA 19,0,168,8,40,8
        ,8,168,0
OA 2050 OATA 20,0,136,136,13
        6,168,8,8,0
ON 2060 LATA 21,0,168,128,16
        8,8,8,168,0
LD 2070 OATA 22,0,168,128,16
        8,136,136,168,0
NA 2080 OATA 23,0,168,8,8,8,
        8,8,0
LG 2090 OATA 24,0,168,136,16
        8,136,136,168,0
DL 2100 DATA 25,0,168,136,16
        8,8,8,168,0
PG 2110 OATA 26,0,0,40,40,0,
        40,40,0
KL 2120 OATA 33,0,168,136,13
        6,168,136,136,0
JK 2130 OATA 34,0,160,136,16
        0,136,136,160,0
LB 2140 DATA 35,0,168,136,12
        8,128,136,168,0
KB 2150 OATA 36,0,160,136,13
        6,136,136,160,0
LD 2160 OATA 37,0,168,128,16
        0,128,128,168,0
LB 2170 OATA 38,0,168,128,12
        8,160,128,128,0
LA 2180 DATA 39,0,168,136,12
        8,136,136,160,0
KL 2190 OATA 40,0,136,136,16
        8,136,136,136,0
NF 2200 OATA 41,0,168,32,32,
        32,32,168,0
BO 2210 OATA 42,0,8,8,8,8,13
        6,168,0
JN 2220 OATA 43,0,136,136,16
        0,160,136,136,0
KP 2230 OATA 44,0,128,128,12
        8,128,128,168,0
LB 2240 OATA 45,0,136,168,16
        8,136,136,136,0
KN 2250 DATA 46,0,128,160,13
        6,136,136,136,0
LF 2260 OATA 47,0,168,136,13
        6,136,136,168,0
LJ 2270 OATA 48,0,168,136,13
        6,168,128,128,0
LJ 2280 OATA 49,0,168,136,13
        6,136,136,160,8
KK 2290 DATA 50,0,168,136,13
        6,136,160,136,0
ON 2300 OATA 51,0,168,128,16
        8,8,8,168,0
JP 2310 DATA 52,0,168,32,32,
        32,32,32,0
KK 2320 OATA 53,0,136,136,13
        6,136,136,168,0
DN 2330 OATA 54,0,136,136,13
        6,136,32,32,0
MD 2340 OATA 55,0,136,136,13
        6,168,168,32,0
EB 2350 OATA 56,0,136,136,32
        ,32,136,136,0
AD 2360 OATA 57,0,136,136,13
        6,32,32,32,0
DD 2370 OATA 58,0,168,8,32,3
        2,128,168,0
EL 2380 OATA 59,0,32,128,128
        ,128,128,32,0
GI 2390 DATA 60,0,0,0,0,0,0,
        0,85
LB 2400 DATA 61,0,32,8,8,8,8
        ,32,0
JB 2410 OATA 62,0,0,0,0,0,0,
        0,170
JN 2420 OATA 63,0,0,0,0,0,0,
        0,255
LJ 2430 OATA 65,2,42,37,5,5,
        5,5,5
GO 2440 DATA 66,170,170,85,8
        5,90,89,89,90
BN 2450 OATA 67,170,170,85,8
        5,149,101,101,149
GO 2460 OATA 68,170,170,85,8
        5,85,85,85,90
```

```
KF 2470 DATA 69,170,170,85,8
        5,85,85,85,149
MA 2480 DATA 70,170,170,89,8
        9,89,91,91,91
MB 2490 DATA 71,170,85,85,85
        ,85,255,255,255
MI 2500 DATA 72,160,104,88,8
        0,80,240,240,240
FE 2510 DATA 73,5,5,5,5,5,5,
        5,5
BK 2520 DATA 74,89,89,90,85,
        85,85,85,85
JD 2530 DATA 75,101,101,149,
        85,85,85,85,85
CK 2540 DATA 76,89,89,89,89,
        89,90,85,85
KD 2550 DATA 77,101,89,89,89
        ,101,149,85,85
AM 2560 DATA 78,91,91,91,91,
        91,91,91,89
GJ 2570 DATA 79,255,255,255,
        255,255,255,255,85
DI 2580 DATA 80,240,240,240,
        240,240,240,240,85
KM 2590 DATA 97,0,0,0,10,32,
        170,90,128
LH 2600 DATA 98,0,0,0,128,32
        ,168,148,8
LJ 2610 DATA 99,0,0,0,15,48,
        170,95,192
AE 2620 DATA 100,0,0,0,192,4
        8,168,212,12
MN 2630 DATA 101,0,0,0,10,32
        ,255,90,128
NH 2640 DATA 102,0,0,0,128,3
        2,252,148,8
QD 2650 DATA 103,0,0,0,15,48
        ,255,95,192
AG 2660 DATA 104,0,0,0,192,4
        8,252,212,12
NN 2670 DATA 105,0,0,0,15,48
        ,170,90,128
ON 2680 DATA 106,0,0,0,192,4
        8,168,148,8
NP 2690 DATA 107,0,0,0,10,32
        ,255,95,192
PN 2700 DATA 108,0,0,0,128,3
        2,252,212,12
DI 2710 DATA 109,13,63,255,2
        55,255,255,63,13
QD 2720 DATA 110,85,85,213,2
        13,213,213,85,85
JJ 2730 DATA 111, 170,170,17
        0,170,170,170,170,17
        0
JP 2740 DATA 112, 170,170,17
        1,171,171,171,170,17
        0
LL 2750 DATA 113,176,252,255
        ,255,255,255,252,176
EH 2760 DATA 114,85,85,85,85
        ,85,85,85,85
DO 2770 DATA 115,1,15,63,63,
        63,63,63,63
IG 2780 DATA 116,80,168,234,
        42,42,42,42,42
EL 2790 DATA 117,63,63,15,1,
        0,0,0,85
IP 2800 DATA 118,42,234,168,
        80,64,64,64,85
ED 2810 DATA -1
JN 2819 REM MAIN SCREEN
OM 2820 GRAPHICS 0:POKE 559,
        0:DL=PEEK(560)+256*P
        EEK(561):POKE DL+3,6
        8:POKE 756,CHSET/256
LI 2830 P0$(1,255)=BL$(1,255
        ):POKE 53248,50:POKE
         53249,139:POKE 707,
        0:POKE 53251,120
JL 2840 VV=0.8+RND(0)*0.1:TR
        IES=1:CARS=3:TCARS=3
        :BIKES=5:T=0:S=0:DON
        E=0
KF 2850 SP1=RND(0)*15+81+8*C
        ARS:SP2=RND(0)*10+36
        +8*CARS
AM 2860 POKE DL+6,5:POKE DL+
        7,4
PF 2870 FOR I=DL+8 TO DL+15
GN 2880 POKE I,5:NEXT I
CD 2890 FOR I=DL+16 TO DL+21
KO 2900 POKE I,4
FE 2910 NEXT I
ME 2920 POKE 708,26:POKE 709
        ,198:POKE 710,132:PO
        KE 711,68:POKE 712,0
FC 2940 POSITION 16,1:? "BIK
        ER DAVE"
NM 2950 POSITION 1,2:? "{A}
        {B}{C}{D}{E}{F}{G}
        {■}":REM CONTROL A,B
        ,C,D,E,F,G,H
MG 2960 POSITION 1,3:? "{I}
        {J}{K}{L}{M}{N}{O}
        {■}_________________
        _____mnrrr":REM C
        ONTROL I,J,K,L,M,N,O
        ,P
LC 2970 POSITION 37,4:? "rr"
LE 2980 POSITION 37,5:? "rr"
EA 2990 POSITION 1,6:? "oooop
        q^^^^^^^^^^^^^^^^^^^
        ^^^^^^^^^mnrrr"
DM 3000 IF PRO THEN POSITION
         15,5:? "■■":POSITIO
        N 15,6:? "■■":POKE 7
        07,152
BI 3010 POSITION 1,7:? "oo"
GK 3020 POSITION 1,8:? "oo"
GM 3030 POSITION 1,9:? "oo"
OO 3040 POSITION 1,10:? "ooo
        pq\\\\\\\\\\\\\\\\\\\
        \\\ab■■ef\\\\\\"
AN 3050 POSITION 13,12:? "SP
        EED:000 MPH"
SM 3060 POSITION 1,13:? "CAR
        S JUMPED: 0
        {9 SPACES}BIKES LEFT
        : 5"
NI 3070 POSITION 14,14:? "SC
        ORE:0"
DG 3080 POKE 77,0:POKE 704,2
        48:POKE 705,72:POKE
        706,72:POKE 53277,2:
        POKE 559,62
KM 3090 RETURN
JM 3099 REM SET SKILL LEVEL
NG 3100 POKE 53277,0:GRAPHIC
        S 0:POKE 752,1:POKE
        710,72:POKE 712,72:P
        OKE 709,2:PRO=0:POKE
         77,0
DB 3110 POSITION 8,5:? "Choo
        se your skill level:
        "
IE 3120 POSITION 6,10:? "ROO
        KIE!  Press your sti
        ck up"
IF 3130 POSITION 6,15:? "PRO
        !  Press your stick
        down"
HD 3140 IF STICK(0)=13 THEN
        PRO=1:GOTO 3170
PD 3150 IF STICK(0)=14 THEN
        3170
ML 3160 GOTO 3140
KF 3170 IF PRO THEN POSITION
         6,15:? "PRO":GOTO 3
        190
IK 3180 POSITION 6,10:? "ROO
        KIE"
WL 3190 FOR I=1 TO 100:NEXT
        I:RETURN
```

Program 2: Commodore 64 Biker Dave

Version by Tim Midkiff, Editorial Programmer

```
EF 10 POKE53200,12:POKE53201,1
      2
BH 20 PRINT"{CLR}{7 DOWN}{BLK}
      {RVS}{J}{BLU}{5 SPACES}B
      IKER DAVE WILL BE READY
      {7 SPACES}{BLK}{L}"
MQ 30 PRINT"{RVS}{J}{BLU}
      {5 SPACES}TO RIDE IN JUS
      T A MOMENT{7 SPACES}
      {BLK}{L}{OFF}"
MS 40 PRINT"{RVS}{J}";:PRINTSP
      C(36);:PRINT"{RVS}{L}"
HR 50 PRINT"{RVS}{J}";:PRINTSP
      C(36);:PRINT"{RVS}{L}"
QR 60 PRINT"{RVS}{J}";:PRINTSP
      C(36);:PRINT"{RVS}{L}"
HJ 70 SA=249*64:POKE53250,72:P
      OKE53251,153:POKE53276,2
      :POKE2041,249
JH 00 GOSUB1360:GOSUB1360:REST
      ORE
AG 90 POKE53205,7:POKE53206,1:
      POKE53200,0:POKE53269,2
SC 100 PRINT"{BLK}{DOWN}":PRIN
       TSPC(6);:FORI=1TO22:POK
       E53250,72+I*8:PRINT"{8}
       ";:FORJ=1TO50
QJ 110 NEXT:NEXT:POKE55,0:POKE
       56,40:CLR
CR 120 POKE54276,0:POKE54296,1
       5:POKE54290,120:POKE542
       07,255:GOSUB1370
JK 130 POKE54276,16
GA 140 POKE54277,0:POKE54270,2
       40:POKEV1,0:POKEV2,50
GK 150 FORI=1TO3:POKE214,13:PR
       INT:PRINTTAB(15)"{BLU}G
       ET READY{WHT}";
BF 160 POKE54276,17:FORJ=1TO25
       5:NEXT
XB 170 PRINT"{10 LEFT}
       {10 SPACES}":POKE54276,
       64:FORJ=1TO255:NEXT:NEX
       T
GK 100 FORI=1TO150:NEXT
HX 190 POKE54276,0:POKE54270,2
       40:POKE54277,9
SO 200 POKEV1,0:POKEV2,0:POKE5
       4274,100:POKE54275,0:PO
       KE54276,65
KM 210 X=X+INT(SP*.04)+1:POKEV
       1,SP*TWANOF:POKEV2,SP*.
       0070+TW
CS 220 IFX>FTHENPOKE53264,1B:X
       =X-256:L=1
JK 230 IFL=1THENIFX>55THENGOTO
       290
AP 240 POKEVX,X:IF(PEEK(JS)ANO
       16)=0THENSP=SP+5
MC 250 POKE214,20:PRINT:PRINTT
       AB(19)SP:FORI=OTOF-SP*S
       P:NEXT
SJ 260 IFSP>S1THENPOKE2041,254
AB 270 IFSP>S2THENDX=4:GOTO640
FO 2B0 GOTO210
HC 290 C1=153+C*0:Y=131:POKE53
       251,Y:POKEVX,57:POKE204
       1,253:FORI=1TOF:NEXT
SF 300 X=X-INT(SP*.04)-1:POKEV
       1,SP*TWANOF:POKEV2,SP*.
       0070+TW
CE 310 IFL=0THENIFX<C1THEN360
EF 320 IFX<0THENPOKE53264,16:X
       =F+X:L=0
KF 330 POKEVX,X:IF(PEEK(JS)ANO
```

```
        16)=0THENSP=SP+5
HH 340  POKE214,20:PRINT:PRINTT
        AB(19)SP
FQ 350  FORJ=1TOF-SP*SP:NEXT:GO
        TO300
MM 360  POKE2041,F:DX=-3:DY=INT
        (DX*.35):K=0
AA 370  MP=INT(((SP-JP)*.5+JP)*
        .105)
B8 380  X=X+DX:Y=Y+DY:K=K+1
EE 390  POKEVX,X:POKE53251,Y
XB 400  FORJ=1TOF-SP*SP:NEXT
DQ 410  IFY>131THENY=131:DY=0:P
        OKE2041,253:GOTO380
GF 420  IFK=MPTHENDY=-DY*.3
MH 430  IFX<122THENIFX>117THENI
        FY<112ORY>120THENPOKE53
        251,131:GOTO650
GB 440  IFX<37THEN460
HC 450  GOTO300
CJ 460  C1=242-C*16:Y=195:POKE5
        3251,Y:POKEVX,35:POKE20
        41,249:FORI=1TOF:NEXT
DJ 470  X=X+INT(SP*.04)+1:POKEV
        1,SP*TWANDF:POKEV2,SP*.
        0070+2
RP 480  IFX>C1THEN530
BQ 490  IFX>FTHENPOKE53264,18:X
        =X-256:L=1
CP 500  POKEVX,X:IF(PEEK(JS)AND
        16)=0THENSP=SP+5
QA 510  POKE214,20:PRINT:PRINTT
        AB(19)SP
XF 520  FORJ=1TOF-SP*SP:NEXT:GO
        TO470
DR 530  POKE2041,254:DX=4:DY=-I
        NT(DX*.5):K=0
RH 540  MP=INT(((SP-JP)*.5+JP)*
        .105)
PP 550  X=X+DX:Y=Y+DY:K=K+1
AA 560  IFX>FTHENPOKE53264,10:X
        =X-256:L=1
CX 570  POKEVX,X:POKE53251,Y
FE 580  FORJ=1TOF-SP*SP:NEXT
AP 590  IFY<195THEN620
XP 600  Y=195:POKE53251,Y:POKE2
        041,249:IFX<54ORX>66THE
        N640
ES 610  GOTO790
FX 620  IFK=MPTHENDY=-INT(DY*.3
        )
AQ 630  GOTO550
QF 640  C1=-5:POKE2041,249:GOTO
        660
CJ 650  C1=-2:POKE2041,253
BX 660  X=X+DX:C1=-C1:POKE2041,
        PEEK(2041)+C1
AP 670  IFX>FTHENPOKE53264,10:X
        =X-256:L=1
AH 680  IFL=1THENIFX>53THENIFY=
        67THEN730
QP 690  IFX<40THENIFL=0THEN730
HF 700  IFX>100THENIFL=1THEN730
SB 710  POKEVX,X:FORJ=1TOF-SP*S
        P:NEXT
EM 720  POKEV2,RND(1)*4:POKEV1,
        F*RND(1):GOTO660
AE 730  POKE54276,64:POKEVX,0:P
        OKE53264,16
AM 740  POKE54279,0:POKE54280,4
        :POKE54284,37:POKE54205
        ,250:POKE54203,129
RJ 750  FORI=1TO15:J=RND(1)*6
DA 760  POKE53265,(PEEK(53265)A
        ND240)ORJ:POKE53270,(PE
        EK(53270)AND240)ORJ
FK 770  NEXT:POKE54203,120:FORI
        =1TO255:NEXT
HH 780  POKE53265,27:POKE53270,
        200:GOTO950
MF 790  X=X+DX
PE 000  IFX>150THENPOKE54276,0:
        GOTO040
MB 010  POKEVX,X
QM 820  FORJ=1TOF-SP*SP:NEXT
RR 830  GOTO790
BC 040  POKE214,21:PRINT:FRINTT
        AB(14)TC
XP 050  C=C+1:TC=TC+C:S=2*(C*10
        -TR*5):TR=2:IFC>9THEND=
        1:GOTO1270
BG 060  S1=RND(1)*10+36+0*C:S2=
        RND(1)*15+01+0*C:JF=RND
        (1)*20+90
JF 070  POKE54277,0:POKE54270,1
        60:POKEV1,47:POKEV2,65:
        POKE54274,0:POKE54275,0
AK 000  FORI=TTOT+SSTEP5
AK 890  POKE54276,65:POKE54276,
        64
CD 900  POKE214,22:PRINT:PRINTT
        AB(19)I:FORJ=1TO50:NEXT
XP 910  NEXT:T=T+S
GH 920  FORI=1TO0:POKE53254,PEE
        K(53254)-2:POKE53250,PE
        EK(53250)+1:NEXT
EB 930  GOSU81160
RC 940  GOTO970
FA 950  8I=8I-1:IFBI>0THENTR=TR
        +1:POKE214,21:PRINT:PRI
        NTTAB(35)BI:GOTO970
AG 960  D=0:GOTO1270
HE 970  POKE54272,0:POKE54273,0
HR 980  X=42:Y=67:POKE2041,249:
        POKE53251,Y:POKEVX,X:PO
        KE53264,16:L=0:SP=5
HD 990  POKE214,20:PRINT:PRINTT
        A8(19)" 0{2 SPACES}"
CJ 1000 GOTO130
PR 1010 POKE53200,12:POKE53201
        ,12
MS 1015 PRINT"{CLR}{RIGHT}
        {8LU}{RVS}BIKER":PRINT
        "{RIGHT}{RVS} DAVE":PR
        INT"{RIGHT}{BLK}{G}
        {3 SPACES}{M}";TAB(36)
        ;"{RVS}{6}{2 SPACES}
        {*}"
HP 1020 PRINT"{BLK} L{3 P}@
        {30 P}{RVS}{6}
        {3 SPACES}"
QP 1030 PRINTTAB(37);:GOSUB115
        0
EQ 1040 PRINT" {RVS}£
        {2 SPACES}";TAB(36);"
        {3 SPACES}"
DG 1050 PRINT" {RVS}{3 SPACES}
        {BLK}{OFF}{32 P}{RVS}
        {6}{2 SPACES}{OFF}£"
FS 1060 PRINT" ";:GOSUB1150
EX 1070 PRINT" {RVS}{3 SPACES}
        "
BJ 1000 PRINT" {*}{RVS}
        {2 SPACES}{OFF}{8LK}
        {22 P}{6 SPACES}{7 P}"
CF 1090 FORC=1TO3:GOSUB1160:NE
        XT:PRINT
MK 1100 POKE56095,0:POKE1823,1
        11
ED 1110 PRINTTAB(13)"{WHT}SPEE
        D: 0{3 SPACES}MPH"
PH 1120 PRINT" CARS JUMPED:
        {2 SPACES}0{0 SPACES}8
        IKES LEFT: 5"
GP 1130 PRINTTAB(13)"SCORE: 0"
KG 1140 RETURN
BC 1150 PRINT"{RVS}{2 SPACES}
        {DOWN}{2 LEFT}
        {2 SPACES}{DOWN}
        {2 LEFT}{2 SPACES}
        {DOWN}{2 LEFT}
        {2 SPACES}{DOWN}
        {2 LEFT}{2 SPACES}
        {DOWN}{2 LEFT}
        {2 SPACES}":RETURN
XJ 1160 J=INT(RND(1)*0):POKE21
        4,17:PRINT:PRINTTAB(32
        -C*2);C$(J);"
        {2 SPACES}{2 LEFT}
        {DOWN}↑←{WHT}":RETURN
FE 1170 X=42:Y=67:POKE53250,X:
        POKE53251,Y:POKE53275,
        2:POKE53276,66
SA 1180 POKE53254,206:POKE5325
        5,195:POKE53256,26:POK
        E53257,195
RS 1190 POKE53250,150:POKE5325
        9,131:POKE53240,120:PO
        KE53249,109
XC 1200 POKE53252,120:POKE5325
        3,109:POKE53260,120:PO
        KE53261,94
PF 1210 POKE53264,16:SP=5:L=0
MG 1220 FORI=0TO4:POKE2040+I,2
        40+I:NEXT:POKE2045,252
        :POKE2046,246
RM 1230 POKE53271,69
HM 1240 POKE53269,127:POKE5327
        7,16:POKE53290,0:POKE5
        3291,0:POKE53292,0
RG 1250 POKE53207,0:POKE53209,
        0:POKE53293,10
KS 1260 RETURN
SG 1270 POKE54276,64:POKE53201
        ,6:POKE53269,0:PRINT"
        {CLR}{5 DOWN}"
CS 1200 IFDTHENPRINTTAB(5)"
        {WHT}{DOWN}CONSIDER YO
        URSELF KING 8IKER!!":G
        OTO1300
PS 1290 PRINT"{DOWN}{4 RIGHT}
        {YEL}YOU HAVE WRECKED
        {SPACE}YOUR LAST 8IKE!
        "
BC 1300 PRINT"{DOWN}{5 RIGHT}
        {YEL}YOU SUCCESSFULLY
        {SPACE}JUMPED";TC-C;"C
        ARS"
AX 1310 PRINTTAB(11)"{DOWN}
        {YEL}FINAL SCORE IS";T
BQ 1320 PRINTTAB(0)"{2 DOWN}
        {CYN}PRESS FIRE TO PLA
        Y AGAIN"
FE 1330 IF(PEEK(JS)AND16)=0THE
        NGOSUB1380:GOTO130
XE 1340 GOTO1330
QK 1350 FORJ=248TO255:SA=J*64:
        GOSUB1360:NEXT:RETURN
AC 1360 FORI=0TO39:READA:POKES
        A+I,A:NEXT:FORI=40TO63
        :POKESA+I,0:NEXT:RETUR
        N
XX 1370 GOSUB1350:GOSUB1820:GO
        SUB1900:GOSUB2070
EH 1380 X=42:SP=5:Y=67:DX=DY:L
        =0:K=MP:VX=53250:V1=54
        272:V2=54273:TW=2:F=25
        5
SA 1390 JS=56320:JP=RND(1)*20+
        90:C=3:S1=65:S2=105:BI
        =5:T=0:TR=2:S=0:TC=3
GB 1400 GOSUB1010:C=3:GOSUB117
        0
RK 1410 RETURN
HB 1420 DATA0,12,0,0,6,0,0,3
JK 1430 DATA0,0,1,128,0,1,128,
        0
EA 1440 DATA0,192,0,0,192,0,0,
        192
SE 1450 DATA0,1,120,0,1,128,0,
        3
BC 1460 DATA0,0,6,0,0,12,0,0
GA 1470 DATA0,0,0,0,0,0,0,15
CF 1480 DATA0,0,15,0,0,60,0,0
SS 1490 DATA252,0,3,207,0,23,1
        95,64
FX 1500 DATA87,213,80,105,246,
        144,130,120
```

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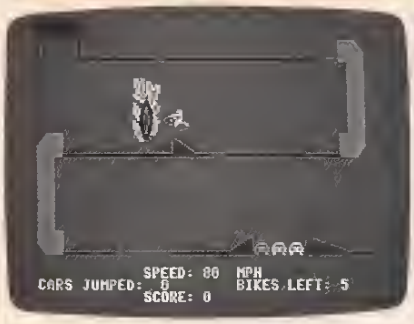
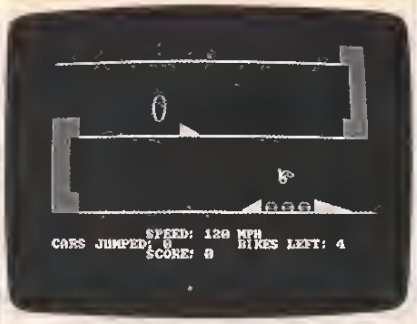


The Commodore 64 version of "Biker Dave" features a flaming hoop.

```
DQ 1510 DATA32,130,200,32,40,2
        ,128,0
EH 1520 DATA0,48,0,0,96,0,0,19
        2
CA 1530 DATA0,1,128,0,1,128,0,
        3
DX 1540 DATA0,0,3,0,0,3,0,0
RJ 1550 DATA1,128,0,1,128,0,0,
        192
RB 1560 DATA0,0,96,0,0,48,0,0
MM 1570 DATA0,0,0,0,0,0,0,0
GS 1580 DATA0,0,0,0,0,0,3,0
CJ 1590 DATA0,15,0,0,63,0,0,25
        5
PR 1600 DATA0,3,255,0,15,255,0
        ,63
JS 1610 DATA255,0,255,255,3,25
        5,255,0
XJ 1620 DATA0,0,0,0,0,0,0,0
CH 1630 DATA0,0,0,0,192,0,0,24
        0
XA 1640 DATA0,0,252,0,0,255,0,
        0
HF 1650 DATA255,192,0,255,240,
        0,255,252
CM 1660 DATA0,255,255,0,255,25
        5,192,0
MQ 1670 DATA0,0,0,0,0,0,15,0
KX 1680 DATA0,15,0,0,3,192,0,3
KJ 1690 DATA240,0,15,60,0,28,6
        1,64
RP 1700 DATA85,125,80,105,246,
        144,130,216
XG 1710 DATA32,130,56,32,40,2,
        128,0
SF 1720 DATA3,192,0,3,192,0,3,
        0
XS 1730 DATA0,3,245,0,3,5,64,3
JB 1740 DATA22,128,3,216,32,3,
        248,32
SD 1750 DATA21,114,128,90,112,
        0,96,176
DF 1760 DATA0,32,128,0,10,0,0,
        0
KA 1770 DATA0,60,0,0,60,0,0,12
RB 1780 DATA0,5,252,0,21,12,0,
        41
QJ 1790 DATA76,0,130,124,0,130
        ,252,0
FK 1800 DATA40,213,64,0,218,80
        ,0,224
AD 1810 DATA144,0,32,128,0,10,
        0,0
QS 1820 ML$="[I]"+CHR$(8)+"[X]
        <"+CHR$(3)+"[2]XJ"+CHR
        $(16)+CHR$(248)+"L[8]
        [T]":POKE835,0
CD 1830 POKE836,208:POKE830,0:
        POKE831,216:POKE828,0:
        POKE829,56:POKE56334,0
GC 1840 POKE1,51:ML$=ML$:SYS(P
        EEK(51)+256*PEEK(52)):
        POKE1,55:POKE56334,I
```



Press the space bar to accelerate the motorcycle in the IBM PC/PCjr version of "Biker Dave."

```
KF 1850 FORI=12528TO12543:READ
        J:POKEI,J:NEXT:POKE532
        72,PEEK(53272)AND240OR
        12
EP 1860 FORI=0TO7:READA:C$(I)=
        CHR$(A):NEXT:RETURN
HG 1870 DATA 15,16,32,127,103,
        127,48,48
KK 1880 DATA 224,16,8,252,204,
        252,24,24
JF 1890 DATA5,28,31,144,153,15
        5,158,159
FE 1900 J=15744:FORI=0TO127:RE
        ADA:POKEJ+I,A:NEXT:RET
        URN
HH 1910 DATA81,64,0,102,69,0,1
        02,70
HM 1920 DATA69,26,70,89,22,69,
        169,105
GQ 1930 DATA145,164,22,161,164
        ,1,65,144
KM 1940 DATA64,0,148,80,0,73,1
        00,0
AE 1950 DATA25,100,0,36,24,0,1
        6,4
QP 1960 DATA0,20,64,0,41,80,0,
        36
QG 1970 DATA100,0,36,25,0,164,
        25,0
FA 1980 DATA80,6,128,0,1,64,0,
        1
HC 1990 DATA0,0,0,16,0,0,101,6
        9
SK 2000 DATA5,102,70,89,106,65
        ,164,25
GP 2010 DATA145,164,6,161,144,
        1,65,144
MG 2020 DATA80,0,64,100,0,5,24
        ,0
PP 2030 DATA25,24,0,41,24,0,20
        ,68
BP 2040 DATA0,0,80,0,5,100,0,2
        5
QC 2050 DATA100,0,36,25,0,164,
        5,0
QR 2060 DATA80,6,128,0,1,64,0,
        1
P8 2070 FORI=0TO57:READA:POKE8
        20+I,A:NEXT:SYS820:RET
        URN
CP 2080 DATA 120,169,65,141,20
        ,3,169,3,141,21
BJ 2090 DATA 3,88,96,173,27,21
        2,41,1,77,254
AX 2100 DATA 7,141,254,7,165,2
        03,201,60,208,15
SJ 2110 DATA 32,100,3,32,159,2
        55,165,203,201,60
JA 2120 DATA 208,247,32,103,3,
        76,49,234,32,159
AF 2130 DATA 255,165,203,201,6
        0,240,247,96
```

"Biker Dave" for Amiga computers.

Program 3: IBM PC/PCjr Biker Dave

Version by Tim Midkiff, Editorial Programmer

```
QL 10 GOSUB 1200:GET(288,1)-(312
      ,17),T
FF 20 FOR I=1 TO 2500:NEXT:X=8:Y
      =5:PUT(X,Y),00
DH 30 FOR I=1 TO 3:LOCATE 6,15:P
      RINT"GET READY":SOUND 1760
      ,5
QO 40 FOR J=1 TO 255:NEXT:LOCATE
       6,15:PRINT"          "
NH 50 FOR J=1 TO 255:NEXT:NEXT:F
      OR I=1 TO 150:NEXT
IF 60 WHILE X<285 AND SP<52
LK 70 X=X+INT(SP*.04)+1:K$=INKEY
      $:IF K$=" " THEN SP=SP+5
MO 80 K$=INKEY$:IF K$=" " THEN SP
      =SP+5
IP 90 LOCATE 21,19:PRINT SP:FOR
      I=1 TO 20-(SP MOD 25):NEXT
EF 100 SOUND SP*50+37,.5
BI 110 IF SP>51 THEN PUT(X,Y),01
      ,PSET ELSE PUT(X,Y),D0,PS
      ET:IF X>265 THEN PUT(288,
      1),T,PSET
LF 120 PUT(288,1),T,PSET
EK 130 WEND
LF 140 IF SP>=52 THEN 550
II 150 Y=69:C1=119+C*8
DB 160 WHILE X>C1
IA 170 X=X-INT(SP*.04)-1:K$=INKE
      Y$:IF K$=" " THEN SP=SP+5
PA 180 LOCATE 21,19:PRINT SP:FOR
       I=1 TO 20-(SP MOD 25):NE
      XT
FH 190 SOUND SP*50+37,.5
OH 200 PUT(X,Y),D2,PSET:PUT(288,
      65),T,PSET
DH 210 WEND
MF 220 DX=-3:DY=INT(DX*.35):K=0:
      MP=INT(((SP-JP)*.5+JP)*.1
      05)
IK 230 PUT(X,Y),D2:GOSUB 1010:PU
      T(X,Y),D3:C1=C1-9
CN 240 X1=X:X=X+DX:Y1=Y:Y=Y+DY:K
      =K+1:FOR I=1 TO 20-(SP MO
      D 25):NEXT
FA 250 SOUND SP*50+37,.5
CI 260 IF X<98 THEN IF X>93 THEN
       IF Y<49 OR Y>57 THEN 480
DE 270 IF X<93 THEN IF Y>69 THEN
       PUT(X1,Y1),03:Y=69:DY=0
KN 280 IF K=MP THEN DY=-DY*.3
KI 290 IF DY=0 THEN PUT(X,Y),02,
      PSET ELSE PUT(X1,Y1),03:P
      UT(X,Y),03
GN 300 PUT(8,65),T,PSET:IF X<16
```

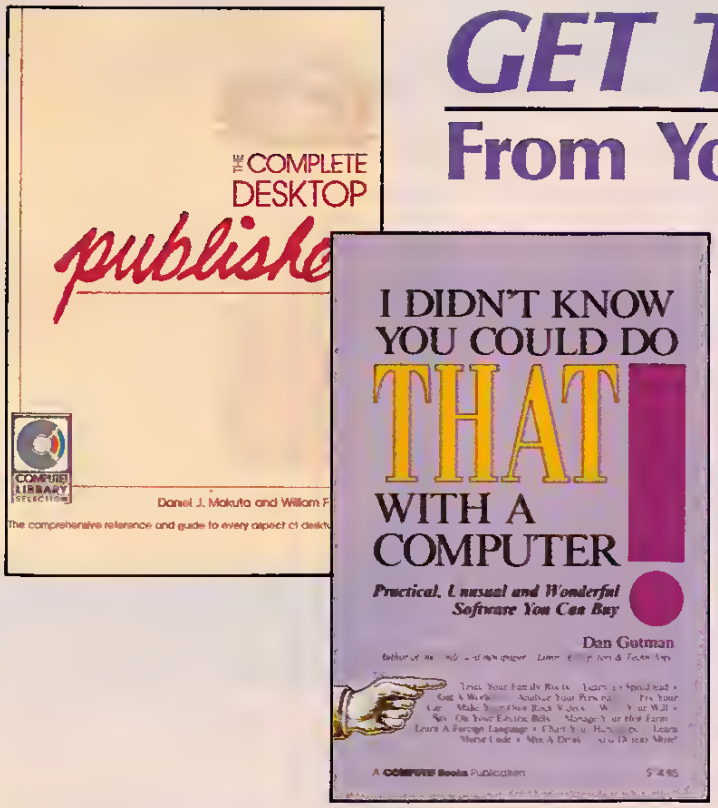
```
      THEN 320
DG 310 GOTO 240
MG 320 C1=214-C%16:Y=133
MF 330 WHILE X<C1
EE 340 X=X+INT(SP%.04)+1:K$=INKE
       Y$:IF K$=B$ THEN SP=SP+5
ID 350 LOCATE 21,19:PRINT SP:FOR
        I=1 TO 20-(SP MOD 5):NEX
       T
FD 360 SOUND SP%SD+37,.5
QI 370 PUT(X,Y),D0,PSET:PUT(8,12
       9),T,PSET
EG 380 WEND
CG 390 DX=4:DY=-INT(DX%.5):K=0
QI 400 PUT(X,Y),D0:GOSUB 1020:PU
       T(X,Y),D1
IO 410 MP=INT(((SP-JP+C)%.5+JP+C
       )%.105)
CL 420 X1=X:X=X+DX:Y1=Y:Y=Y+DY:K
       =K+1:FOR I=1 TO 20-(SP MO
       D 25):NEXT
FO 430 SOUND SP%SD+37,.5
KC 440 IF X>296 THEN PUT(X1,Y1),
       D1:GOTO 830
PO 450 IF Y>133 THEN Y=133:DY=0:
       IF X<286 OR X>294 THEN 62
       0 ELSE 690
EB 460 IF K=MP THEN DY=-INT(DY%.
       3)
NP 470 PUT(X1,Y1),D1:PUT(X,Y),D1
       :GOTO 420
LN 480 PUT(X1,Y1),D3:Y=69:K=0
EG 490 WHILE X>16
CG 500 X=X+DX:FOR I=1 TO 50-(SP
       MOD 25):NEXT:SOUND SP%RND
       (1)+37,.1
LP 510 IF K=0 THEN PUT(X,Y),D3,P
       SET:K=1 ELSE PUT(X,Y),D2,
       PSET:K=0
EP 520 PUT(8,65),T,PSET
EO 530 WEND
HP 540 GOTO 830
JL 550 K=0:DX=3
HN 560 WHILE X<285
DE 570 X=X+DX:FOR I=1 TO 50-(SP
       MOD 25):NEXT:SOUND SP%RND
       (1)+37,.1
DH 580 IF K=0 THEN PUT(X,Y),D0,P
       SET:K=1 ELSE PUT(X,Y),D1,
       PSET:K=0
MN 590 PUT(288,1),T,PSET
EJ 600 WEND
HK 610 GOTO 830
IG 620 K=0:DX=3
IF 630 WHILE X<296
KH 640 IF K=0 THEN PUT(X1,Y),D1:
       PUT(X,Y),D0:K=1 ELSE PUT(
       X1,Y),D0:PUT(X,Y),D1:K=0
QL 650 X1=X:X=X+DX:FOR I=1 TO 50
       -(SP MOD 25):NEXT:SOUND S
       P%RND(1)+37,.1
EF 660 WEND
NH 670 IF K=0 THEN PUT(X1,Y),D1
       ELSE PUT(X1,Y),D0
II 680 GOTO 830
QN 690 PUT(X1,YI),D1:PUT(X1,Y),D
       0
IA 700 WHILE X<296
LA 710 PUT(X1,Y),D0:PUT(X,Y),D0
CL 720 X1=X:X=X+DX:FOR I=1 TO 20
       -(SP MOD 5):NEXT
EA 730 WEND
FE 740 PUT(X1,Y),D0
NH 750 LOCATE 22,14:PRINT TC:C=C
       +1:TC=TC+C:S=2*(C%10-TR%5
       ):TR=2
EL 760 S1=RND(1)%10+36+8%C:S2=RN
       D(1)%15+81+8%C:JP=RND(1)%
       20+90
LN 770 FOR I=T TO T+S STEP 5
LL 780 LOCATE 23,19:PRINT I:SOUN
       D 220,.1:FOR J=1 TO 50:NE
       XT
IP 790 NEXT:T=T+S
ND 800 C1=104+(C-1)%8:PUT(C1,71)
       ,R1:GOSUB 1010
MJ 810 C1=236-(C-1)%16:PUT(C1,13
       5),R2:GOSUB 1020:GOSUB 10
       30
IE 820 GOTO 850
BD 830 BI=BI-I:SOUND 440,8
GN 840 IF BI>0 THEN TR=TR+1:LOCA
       TE 22,35:PRINT BI ELSE 10
       40
JB 850 SP=5:POKE 1050,PEEK(1052)
JL 860 LOCATE 21,19:PRINT" 0  ":
       GOTO 20
JJ 870 LINE(8,17)-(288,17),3
BI 880 DRAW"C1U16R24D80L24U16R8U
       48L88E8P1,1"
DI 890 LINE(288,81)-(32,81),3
KE 900 DRAW"C1U16L24D80R24U16L8U
       48R88H8P1,1"
NP 910 LINE(32,145)-(320,145),3
MM 920 DRAW"C38M292,144M-34,-9D9
       8E1P3,3"
NM 930 PUT(101,46),H2:PUT(108,46
       ),H1
DE 940 LOCATE 21,13:PRINT"SPEED:
        0   MPH"
DJ 950 PRINT" CARS JUMPED: 0
            BIKES LEFT: 5"
DB 960 LOCATE 23,13:PRINT"SCORE:
       0"
IP 970 DRAW"C38M145,80M-17,-9D98
       E1P3,3":GET (128,71)-(145
       ,80),R1
GQ 980 DRAW"C38M188,144M+17,-9D9
       8H1P3,3":GET(188,135)-(20
       5,144),R2
MK 990 FOR C=1 TO 3:GOSUB 1030:N
       EXT:C=3
IL 1000 RETURN
MJ 1010 C1=104+C%8:PUT(CI,71),R1
       ,PSET:RETURN
ID 1020 CI=236-C%16:PUT(CI,135),
       R2,PSET:RETURN
PF 1030 C1=258-C%16:PUT(CI,137),
       CA,PSET:RETURN
DQ 1040 CLS:IF D THEN LOCATE 5,5
       :PRINT"CONSIDER YOURSELF
        KING BIKER!!":GOTO 1060
LL 1050 LOCATE 7,4:PRINT"YOU HAV
       E WRECKED YOUR LAST BIKE
       !"
JE 1060 LOCATE 9,5:PRINT"YOU SUC
       CESSFULLY JUMPED";TC-C;"
       CARS"
LK 1070 LOCATE 11,11:PRINT"FINAL
        SCORE IS";T
QP 1080 LOCATE 14,8:PRINT"PRESS
       SPACE TO PLAY AGAIN"
QO 1090 WHILE K$<>B$:K$=INKEY$:W
       END
DC 1100 RUN
IA 1110 RETURN
FB 1120 READ X,Y:E=(4+INT((X+7)/
       8)%Y)/2:DIM D0(E):D0(0)=
       X:D0(1)=Y:FOR I=2 TO E:R
       EAD A$:D0(I)=VAL("&H"+A$
       ):NEXT
EP 1130 READ X,Y:E=(4+INT((X+7)/
       8)%Y)/2:DIM D1(E):D1(0)=
       X:D1(1)=Y:FOR I=2 TO E:R
       EAD A$:D1(I)=VAL("&H"+A$
       ):NEXT
DN 1140 READ X,Y:E=(4+INT((X+7)/
       8)%Y)/2:DIM D2(E):D2(0)=
       X:D2(1)=Y:FOR I=2 TO E:R
       EAD A$:D2(I)=VAL("&H"+A$
       ):NEXT
CL 1150 READ X,Y:E=(4+INT((X+7)/
       8)%Y)/2:DIM D3(E):D3(0)=
       X:D3(1)=Y:FOR I=2 TO E:R
       EAD A$:D3(I)=VAL("&H"+A$
       ):NEXT
OE 1160 READ X,Y:E=(4+INT((X+7)/
       8)%Y)/2:DIM H1(E):H1(0)=
       X:H1(1)=Y:FOR I=2 TO E:R
       EAD A$:H1(I)=VAL("&H"+A$
       ):NEXT
NC 1170 READ X,Y:E=(4+INT((X+7)/
       8)%Y)/2:DIM H2(E):H2(0)=
       X:H2(1)=Y:FOR I=2 TO E:R
       EAD A$:H2(I)=VAL("&H"+A$
       ):NEXT
BH 1180 READ X,Y:E=(4+INT((X+7)/
       8)%Y)/2:DIM CA(E):CA(0)=
       X:CA(1)=Y:FOR I=2 TO E:R
       EAD A$:CA(I)=VAL("&H"+A$
       ):NEXT
KI 1190 RETURN
PH 1200 KEY OFF:DEF SEG=0:DEFINT
        A-Z:DIM T(100),R1(49),R
       2(49)
QN 1210 SCREEN 1,0:COLOR 0,1:CLS
       :RANDOMIZE TIMER
BI 1220 GOSUB 1120:GOSUB 870
LF 1230 SP=5:B$=" ":S1=70:S2=110
       :JP=100:BI=5:T=0:TR=I:S=
       0:TC=3:SD=.5
JL 1240 RETURN
PC 1250 DATA 48,12,0,0,0,0,300,C
       0
ML 1260 DATA 0,300,C0,0,300,0,0,
       F00
PP 1270 DATA 40C1,0,3C00,50FF,0,
       FC00,1400,0
KA 1280 DATA FF05,5545,0,AF1A,A9
       DA,0,828,AE8
KH 1290 DATA 0,F28,A28,0,A00A,A8
       0A,0
OB 1300 DATA 48,12,0,3C,0,0,53C,
       54
ID 1310 DATA 0,3C0C,4015,0,F00F,
       A85A,0,F
JN 1320 DATA A68,0,50F,A68,0,FD0
       F,A80A,0
QI 1330 DATA FF07,C0,0,A816,C0,0
       ,31A,80
ED 1340 DATA 0,20A,80,0,AA02,0,0
NM 1350 DATA 48,12,0,0,0,300,C0,
       0
CP 1360 DATA 300,C0,0,0,C0,0,430
       1,F0
EO 1370 DATA 0,FF05,3C,0,14,3F,0
       ,5055
KI 1380 DATA 50FF,0,A76A,A4FA,0,
       28A0,28E0,0
IH 1390 DATA 28A0,28F0,0,A02A,A0
       0A,0,0
JB 1400 DATA 48,12,0,3C00,0,1500
       ,3C50,0
QA 1410 DATA 5401,303C,0,A52A,F0
       0F,0,29A0,F000
FK 1420 DATA 0,29A0,F050,0,A02A,
       F07F,0,300
FJ 1430 DATA D0FF,0,300,94EA,0,3
       00,A480,0
JD 1440 DATA 200,A080,0,0,80AA,0
       ,0
DC 1450 DATA 12,23,80,28,A,A,800
       2,8002
CI 1460 DATA 8002,A000,A000,A000
       ,A000,A000,A000,A000
JN 1470 DATA A000,A000,8002,8002
       ,8002,A,A,28
LN 1480 DATA 80,0
NK 1490 DATA 14,23,2800,8002,A,A
       ,28,28
LC 1500 DATA 28,A0,A0,A0,A0,A0,A
       0,A0
IL 1510 DATA A0,A0,28,28,28,A,A,
       8002
ID 1520 DATA 2800,0
II 1530 DATA 24,8,AA02,880,2000,
       20,AA08,AAAA
DB 1540 DATA 8C,AA3E,AAAA,14,141
       4,1400,0
```

Program 4: Amiga Biker Dave

Version by Tim Midkiff, Editorial Programmer

```
GOSUB Initialize
'
Setup:
COLOR 3,0:CLS:RANDOMIZE TIMER
GOSUB IntScreen
sp=5:b$=" ":sl=70:s2=110:jp=100:
bi=5:t=0:tr=1:s=0:tc=3:so=10:f=1
000
FOR i=0 TO 255:IF i<128 THEN pw(
i)=127 ELSE pw(i)=-128:NEXT:WAVE
3,pw
GET(283,1)-(307,17),t
'
StartRun:
FOR i=1 TO 500:NEXT:x=7:y=4:PUT
(x,y),d0
FOR i=1 TO 3:LOCATE 6,15:PRINT"G
ET READY":SOUND 1760,2
FOR j=1 TO 250:NEXT:LOCATE 6,15:
PRINT"          "
FOR j=1 TO 250:NEXT:NEXT:POR i=1
TO 150:NEXT
WHILE x<280 AND sp<s2
x=x+INT(sp*.04)+1:IF MOUSE(0)<>0
THEN sp=sp+5
LOCATE 21,19:PRINT sp:FOR i=1 TO
20-(sp MOD 25):NEXT
SOUND sp*so+f,.04,,3
IF sp>s1 THEN PUT(x,y),d1,PSET E
LSE PUT(x,y),d0,PSET
PUT(2B3,1),t,PSET
WEND
IF sp>=s2 THEN CrashRight1
'
JumpLeft:
y=68:c1=114+c*B
WHILE x>c1
x=x-INT(sp*.04)-1:IF MOUSE(0)<>0
THEN sp=sp+5
LOCATE 21,19:PRINT sp:FOR i=1 TO
20-(sp MOD 25):NEXT
SOUND sp*so+f,.02,,3
PUT(x,y),d2,PSET:PUT(283,65),t,P
SET
WEND
dx=-3:dy=INT(dx*.35):k=0:mp=INT(
((sp-jp)*.5+jp)*.105)
PUT(x,y),d2:GOSUB Rampl:PUT(x,y)
,d3:c1=c1-9
10 x1=x:x=x+dx:y1=y:y=y+dy:k=k+1
:FOR i=1 TO 20-(sp MOD 25):NEXT
SOUND sp*so+f,.02,,3
IF x<93 THEN IF x>88 THEN IF y<4
8 OR y>56 THEN CrashLeft
IP x<88 THEN IF y>68 THEN PUT(x1
,y1),d3:y=68:dy=0
IF k=mp THEN dy=-dy*.3
IF dy=0 THEN PUT(x,y),d2,PSET EL
SE PUT(x1,y1),d3:PUT(x,y),d3
PUT(3,65),t,PSET:IF x<11 THEN PU
T(92,50),hp,PSET:GOTO JumpRight
GOTO 10
'
JumpRight:
c1=209-c*16:y=132
WHILE x<c1
x=x+INT(sp*.04)+1:IF MOUSE(0)<>0
THEN sp=sp+5
LOCATE 21,19:PRINT sp:FOR i=1 TO
20-(sp MOD 5):NEXT
SOUND sp*so+f,.02,,3
PUT(x,y),d0,PSET:PUT(3,129),t,PS
ET
WEND
dx=4:dy=-INT(dx*.5):k=0
PUT(x,y),d0:GOSUB Ramp2:PUT(x,y)
,d1
mp=INT(((sp-jp+c)*.5+jp+c)*.105)
'
20 x1=x:x=x+dx:y1=y:y=y+dy:k=k+1
:FOR i=1 TO 20-(sp MOD 25):NEXT
SOUND sp*so+f,.02,,3
IF x>291 THEN PUT(x1,y1),d1:GOTO
ResetGame
IF y>132 THEN y=132:dy=0:IF x<2B
0 OR x>289 THEN CrashRight2 ELSE
GoodJump
IF k=mp THEN dy=-INT(dy*.3)
PUT(x1,y1),d1:PUT(x,y),d1:GOTO 2
0
'
CrashLeft:
PUT(x1,y1),d3:y=68:k=0
WHILE x>11
x=x+dx:FOR i=1 TO 50-(sp MOD 25)
:NEXT:SOUND RND*250*so+f,.02,,3
IF k=0 THEN PUT(x,y),d3,PSET:k=1
ELSE PUT(x,y),d2,PSET:k=0
PUT(3,65),t,PSET:PUT(92,50),hp,P
SET
WEND
GOTO ResetGame
'
CrashRight1:
k=0:dx=3
WHILE x<2B0
x=x+dx:FOR i=1 TO 50-(sp MOD 25)
:NEXT:SOUND RND*250*so+f,.02,,3
IF k=0 THEN PUT(x,y),d0,PSET:k=1
ELSE PUT(x,y),d1,PSET:k=0
PUT(283,1),t,PSET
WEND
GOTO ResetGame
'
CrashRight2:
k=0:dx=3
WHILE x<291
IF k=0 THEN PUT(x1,y),d1:PUT(x,y
),d0:k=1 ELSE PUT(x1,y),d0:PUT(x
,y),d1:k=0
x1=x:x=x+dx:POR i=1 TO 50-(sp MO
D 25):NEXT:SOUND RND*250*s0+f,.0
2,,3
WEND
IF k=0 THEN PUT(x1,y),d1 ELSE PU
T(x1,y),d0
GOTO ResetGame
'
GoodJump:
PUT(x1,y1),d1:PUT(x1,y),d0
WHILE x<291
PUT(x1,y),d0:PUT(x,y),d0
x1=x:x=x+dx:FOR i=1 TO 20-(sp MO
D 5):NEXT
WEND
PUT(x1,y),d0
LOCATE 22,14:PRINT tc:c=c+1:tc=t
c+c:s=2*(c*10-tr*5):tr=2
s1=RND*10+36+8*c:s2=RND*15+81+8*
c:jp=RND*20+90
FOR i=t TO t+s STEP 5
LOCATE 23,19:PRINT i:SOUND 15000
,.001,,3:FOR j=1 TO 50:NEXT
NEXT:t=t+s:IF c>9 THEN d=1:EndGa
me
c1=99+(c-1)*8:PUT(c1,71),r1:GOSU
B Rampl
c1=231-(c-1)*16:PUT(c1,135),r2:G
OSUB Ramp2:GOSUB AddCar
GOTO 30
'
ResetGame:
bi=bi-1:j=3
FOR i=1 TO 16:FOR k=1 TO 255:NEX
T
SOUND 200,.5,RND*255
SCROLL (0,0)-(311,153),j,j:j=-j:
NEXT
30 IP bi>0 THEN tr=tr+1:LOCATE 2
2,35:PRINT bi ELSE EndGame
sp=5
LOCATE 21,19:PRINT" 0  ":GOTO St
artRun
'
IntScreen:
LINE(3,17)-(282,17),2
LINE(2B2,81)-(28,81),2
LINE(28,145)-(319,145),2
COLOR 2
AREA(287,144):AREA(253,135):AREA
(253,144):AREAFILL
PUT(92,50),hp
AREA(140,80):AREA(123,71):AREA(1
23,B0):AREAFILL
GET(123,71)-(140,80),r1
AREA(1B3,144):AREA(200,135):AREA
(200,144):AREAFILL
GET(183,135)-(200,144),r2
POR c=1 TO 3:GOSUB AddCar:NEXT:c
=3
COLOR 1
AREA(283,17):AREA(283,1):AREA(30
8,1):AREA(308,81):AREA(2B3,B1)
AREA(283,65):AREA(291,65):AREA(2
91,17):AREA(2B3,17):AREAFILL
AREA(27,81):AREA(27,65):AREA(3,6
5):AREA(3,145):AREA(27,145)
AREA(27,129):AREA(19,129):AREA(1
9,B1):AREA(27,B1):AREAFILL
LOCATE 21,13:PRINT"SPEED: 0   MP
H"
PRINT" CARS JUMPED: 0         BIK
ES LEFT: 5"
LOCATE 23,13:PRINT"SCORE: 0"
RETURN
'
Rampl:c1=99+c*8:PUT(c1,71),r1,PS
ET:RETURN
Ramp2:c1=231-c*16:PUT(c1,135),r2
,PSET:RETURN
AddCar:c1=253-c*16:PUT(c1,137),a
0,PSET:RETURN
'
EndGame:
CLS:COLOR 3
IF d THEN
LOCATE 5,5:PRINT"CONSIDER YOURSE
LF KING BIKER!!"
ELSE
LOCATE 7,4:PRINT"YOU HAVE WRECKE
D YOUR LAST BIKE!"
END IF
COLOR 1:LOCATE 9,5:PRINT"YOU SUC
CESSFULLY JUMPED";tc-c;"CARS"
LOCATE 11,11:PRINT"PINAL SCORE I
S";t:COLOR 3
LOCATE 14,8:PRINT"PRESS BUTTON T
O PLAY AGAIN":i=MOUSE(0)
WHILE MOUSE(0)=0:WEND
GOTO Setup
'
Initialize:
DEFINT a-z:DEFSNG r,9,b:DIM t(10
0),r1(49),r2(49),pw(255),nw(255)
'
SCREEN 1,320,200,2,1
WINDOW 3,"",(0,0)-(311,185),16,1
'

WINDOW OUTPUT 3
WIDTH 40:RESTORE PaletteData:FOR
i=0 TO 3:READ r,g,b:PALETTE i,r,
g,b:NEXT
PaletteData:
DATA .13,0,.73,.9,.9,.9,0,0,0,.8
,.2,0
'
DaveRight:
DIM d0(55):RESTORE DaveRight
POR i=0 TO 55:READ a$:d0(i)=VAL(
"&H"+a$):NEXT
```



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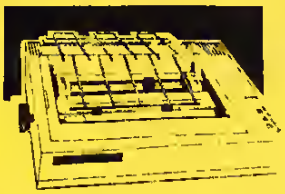

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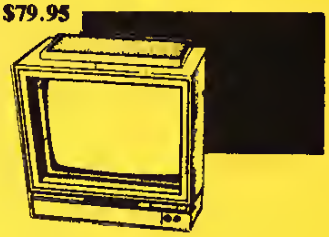

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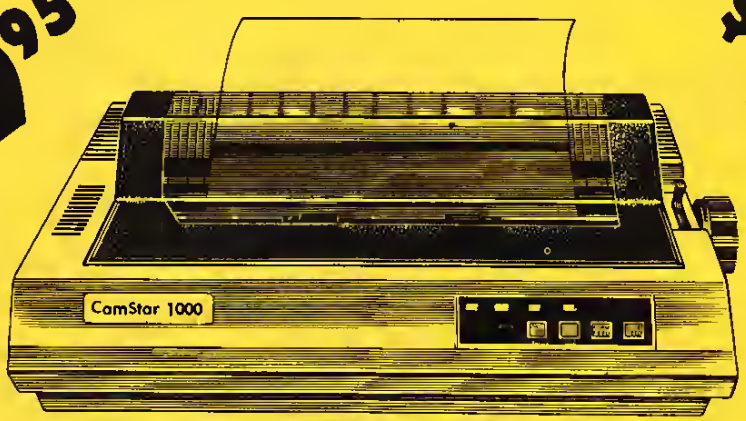

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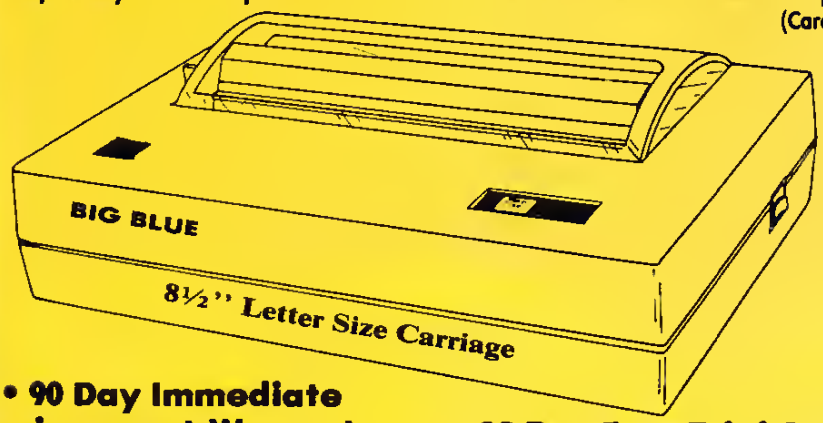

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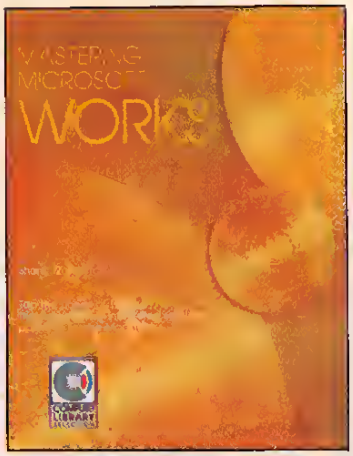

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```
DATA 19,D,2,0,40,0,6000,04
DATA 6074,1,007F,3,0000,6,4400,C
4
DATA 3A00,1F,100,3F,BF94,40,E0FE
,04
DATA C063,0,C03E,0,0,0,0,04
DATA 0,0,0,0,0,0,0,04
DATA 400,0,A00,10,100,3E,3F00,7F
4
DATA 7F00,63,7100,63,3100,3E,1F0
0,04
4
DaveRightWheel:4
DIM d1(55):RESTORE DaveRightWhee
l  4
FOR i=0 TO 55:READ a$:d1(i)=VAL(
"&H"+a$):NEXT4
DATA 18,D,2,10,0,18,E0,104
DATA 00,31,F001,3F,3000,30,4000,
304
DATA C000,3F,0000,3F,0070,41,00C
6,14
DATA 007D,0,0,0,0,0,0,04
DATA 0,0,0,1,E000,1,3800,04
DATA 7E00,0,E300,1,E300,3C,BE00,
7E4
DATA 0000,62,0,63,0,3E,0,04
4
DaveLeft:4
DIM d2(55):RESTORE DaveLeft4
FOR i=0 TO 55:READ a$:d2(i)=VAL(
"&H"+a$):NEXT4
DATA 19,D,2,0,0,300,60,3004
DATA 18,C0,7E,E0,0,1130,0,2E104
DATA 0,407C,0,FEFE,0,03C1,3E,180
4
DATA 63,100,3E,0,0,0,0,04
DATA 0,0,0,0,0,0,0,10004
DATA 0,2800,0,400C,0,7E3E,0,FF3F
4
DATA 0,C763,0,C663,0,7C3E,0,04
4
DaveLeftWheel:4
DIM d3(55):RESTORE DaveLeftWheel
4
FOR i=0 TO 55:READ a$:d3(i)=VAL(
"&H"+a$):NEXT4
DATA 10,D,2,10,18,10,0C,04
DATA C,F8C,FD,1CFC,02,20C,0,30C4
DATA 0,1FC,0,1FC,00,102,0,1804
DATA 3D,0,46,0,7C,0,0,04
DATA 0,0,0,700,0,1C80,0,7E004
DATA 0,C700,0,C700,0,7D3C,0,17E4
DATA 0,46,0,C6,0,7C,0,04
4
Auto:4
DIM a0(19):RESTORE Auto4
FOR i=0 TO 19:READ a$:a0(i)=VAL(
"&H"+a$):NEXT4
DATA C,8,2,1F00,2040,4020,FFF0,E
0704
DATA FFF0,0,0,1F80,2040,4020,FFF
0,9F904
DATA FFF0,C030,C030,04
4
Hoop:4
DIM hp(45):RESTORE Hoop4
FOR i=0 TO 45:READ a$:hp(i)=VAL(
"&H"+a$):NEXT4
DATA A,15,2,1E00,3300,6100,6100,
C0C04
DATA C0C0,C0C0,C0C0,C0C0,C0C0,C0
C0,C0C0,C0C04
DATA C0C0,C0C0,C0C0,C0C0,6100,61
80,3300,1E004
DATA 1E00,3300,6100,6100,C0C0,C0
C0,C0C0,C0C04
DATA C0C0,C0E0,C0E0,C0E0,C0E0,C0
E0,C0E0,C0C04
DATA C0C0,6100,6100,3300,1E00,A0
0,4004
4
RETURN4                    ©
4
```

Atari Sound Commander

James Hague

How would you like to have the ability to create sound effects and music in Atari BASIC without slowing down the rest of your program? "Sound Commander" offers the ability to program sounds that run in the background while other BASIC events are in progress.

One of the strongest features of the Atari eight-bit computer family is its outstanding sound capability. Programmers have done an excellent job of exploiting Atari sound, creating everything from simulated frog croaks to music in four-part harmony. Unfortunately, many of the programs used to create these sounds are written in machine language, which is less widely understood and more difficult to program than BASIC.

Instead of delving into the mysterious world of binary code, many Atari programmers work in Atari BASIC, the language supplied with the computer. Anyone who has created sounds in this language has probably realized that there are three major problems: Complex sounds are difficult to achieve, the timing of a sound loop varies depending on its location in a program, and sound routines occupy a major portion of BASIC's processing time, thus slowing down the entire program.

"Atari Sound Commander" is a set of machine language subroutines for use with BASIC that solves all three problems. It allows quick and easy manipulation of sound without slowing down BASIC. All you have to do is set up a sound, turn it on, and let it run *at the same time* as your BASIC program. Best of all, you can use these routines without understanding machine language. Only one BASIC statement is required to activate each sound.

Setting Up

Program 1 is a BASIC loader that installs Sound Commander in memory. When you're finished typing the program, store it on disk or tape *with a LIST command* (not SAVE) so that you can merge the code with other programs. For example, to list the program to disk with the filename SND.LST, type LIST "D:SND

.LST" and press RETURN.

Here's a short example that illustrates the basic mechanics of using Sound Commander. Type in and save this program:

```
DL 10 DIM S$(B)
MJ 15 GOSUB 30000
NI 25 FOR A=1 TO B
EC 30 READ B:S$(A,A)=CHR$(B)
DI 35 NEXT A
IK 40 A=USR(SETSND,0,ADR(S$)
      ,LEN(S$),80)
KF 45 LIST
KL 50 STOP
OB 55 DATA 170,25,170,50,170
      ,75,170,100
```

After you've saved the program, load it back into memory; then use ENTER to merge the lines from Program 1 with the program in memory. This brings Sound Commander into memory without disturbing the existing program lines. Turn up the volume on your TV or monitor; then run the program and notice that the sounds continue in the background while the program lists itself and returns to immediate mode.

Before Sound Commander can be used by a program, it must be initialized. This is accomplished with the statement GOSUB 30000, which installs Sound Commander in the proper memory location. The setup routine is intelligent, meaning that if you have already installed Sound Commander once, it bypasses most of the initialization.

Program 2 is a more complete demonstration, which also includes examples of complex sound effects. Type in and save the program; then reload it into memory. With Program 2 in memory, use ENTER to merge Program 1. When that operation is done, plug a joystick into port 1 and run the program. It displays six numbers and a movable crosshairs shape on the screen. Use the joystick to move the crosshairs onto each of the numbers in turn. Each number generates a different sound. Notice that you can continue moving the crosshairs even while a sound is in progress.

Designing Sounds

Like any sound utility, Sound Commander can't make a sound until you tell it what sort of sound to create. Don't worry; that's not as difficult as it sounds. For this program, a sound is defined as a list of notes, each having its own unique frequency, distortion, and volume, which are represented as numbers. The Atari BASIC manual explains the significance of the frequency, distortion, and volume numbers, which have the same effect here as in the BASIC SOUND command.

It takes only two numbers to define a note. The first number in a note definition represents the note's distortion and volume. This value is computed by multiplying the distortion value by 16 and adding the volume value. For example, if you want a note with a distortion value of 10 and a volume of 8, the first number of that note's definition is 168 (10 * 16 + 8). The second number in a note definition represents the note's frequency. Thus, the numbers 168 and 50 define a note with a distortion of 10, a volume of 8, and a frequency of 50. The numbers 168, 50, 168, 60 define two notes, each having the same distortion and volume, but with different frequencies. The duration of the sound is determined when you actually call Sound Commander with USR (see below).

In order for Sound Commander to process a sound definition, it must be converted into string form. This may sound strange, since strings usually contain characters, but a string is actually nothing more than an array containing numbers in the range 0–255. Storing the values in string form saves space and allows Sound Commander to process the data efficiently.

Before you store a number in a string, of course, it must be converted into character form with the CHR$ function. For instance, the statement A$(1,1)=CHR$(6) stores the number 6 in the first character position of the string A$. For many notes, a program can READ values from DATA statements and store them in a string within a loop.

Commanding The Commander

Once you understand how to define a sound, the rest is easy. One simple USR call causes Sound Commander to play the sound in the background while BASIC continues on its way. Here's a typical USR call for Sound Commander:

```
DUMMY = USR(SETSND,V,ADR(S$)
  ,LEN(S$),L)
```

The variable DUMMY is required to satisfy the syntax of USR, which takes the form of a BASIC function. Here is an explanation of the other elements in the statement:

SETSND. Defines the location of the machine language routine that starts up the sound. This variable should be defined only once, at the beginning of every program that uses Sound Commander (see Program 1).

V. Defines a voice number (from 0–3) for the sound. If some other sound is already using the voice, Sound Commander turns off the previous sound before it begins the new one.

ADR($S). Defines the address of the string containing the definition of the sound that you wish to play. Substitute the name of your string in place of S$.

LEN(S$). Defines the length of the sound string to be played. Again, substitute your string name for S$. Note that it's not necessary to play an entire string from beginning to end. Many interesting sound effects can be created by playing substrings of a larger string.

L. Defines the length of time to play each note. This value can range from 1–255. A value of one equals 1/60 second. Thus, a value of 60 creates a sound lasting one second, and so on. Low values make the sound play quickly, which is useful for sound effects. Higher values slow down the sound, which is desirable for music.

Once you've performed the USR statement, the sound plays at the desired speed until it is finished, at which time Sound Commander turns it off automatically. While the sound is in progress, BASIC will continue to execute your program, whatever it may be. Now that you understand more about how Sound Commander works, you may want to experiment with the programs to modify the sound they create.

Quiet On The Set

Sound Commander's ability to create sounds in the background is very useful, but has one side effect that's occasionally inconvenient: Once a sound begins, it can't be

turned off until it finishes its entire duration. To remedy this, Sound Commander includes a second routine that immediately silences any designated voice or voices. Here is the format for the quiet command:

DUMMY=USR(QUIET,V1,V2...)

Again, the DUMMY variable is present solely for the sake of syntax. Like SETSND, the variable QUIET is predefined by the setup routine and should not be changed while the program runs. This value is followed by a list of the voices you want to turn off. For instance, DUMMY=USR(QUIET,0,3) turns off voices zero and three.

Keep in mind that Sound Commander doesn't disable the normal SOUND command in Atari BASIC. However, it has to use the same sound hardware, so don't try to perform a SOUND command while a Sound Commander sound is in progress. The END statement causes Sound Commander to skip a beat or two, but pressing the break key does not. Input/output activity such as using the disk or tape drive causes Sound Commander to pause. This shouldn't come as a surprise, since not much else can happen during disk and tape I/O, either. The machine language routines used by Sound Commander are stored in page 6 of memory; you should take care that the rest of your program does not disturb that memory area.

For instructions on entering these listings, please refer to "COMPUTE!'s Guide to Typing In Programs" in this issue of COMPUTE!.

Program 1: Sound Commander

```
KO 30000 IF PEEK(1564)=104 A
         ND PEEK(1565)=162 T
         HEN 30020
IJ 30010 RESTORE 30050:FOR A
         =0 TO 198:READ B:PO
         KE 1564+A,B:NEXT A
JJ 30020 SETSND=1702:QUIET=1
         741
IP 30030 A=USR(1564)
DF 30040 RESTORE :RETURN
LM 30050 DATA 104,162,3,169,
         0,157
LE 30060 DATA 24,6,202,16,25
         0,160
GI 30070 DATA 49,162,6,169,7
         ,32
MM 30080 DATA 92,228,96,216,
         162,3
PM 30090 DATA 189,24,6,240,1
         03,189
FE 30100 DATA 16,6,222,16,6,
         208
JH 30110 DATA 95,189,20,6,15
         7,16
GA 30120 DATA 6,189,12,6,208
         ,18
JI 30130 DATA 189,8,6,208,13
         ,157
MG 30140 DATA 24,6,138,10,16
         8,169
HD 30150 DATA 0,153,1,210,24
         0,66
MG 30160 DATA 189,0,6,133,20
         3,189
EP 30170 DATA 4,6,133,204,16
         0,0
CL 30180 DATA 177,203,72,138
         ,10,168
KN 30190 DATA 104,153,1,210,
         160,1
CE 30200 DATA 177,203,72,138
         ,10,168
AO 30210 DATA 104,153,0,210,
         165,203
BG 30220 DATA 24,105,2,157,0
         ,6
LH 30230 DATA 165,204,105,0,
         157,4
DI 30240 DATA 6,189,8,6,56,2
         33
BC 30250 DATA 2,157,8,6,189,
         12
CF 30260 DATA 6,233,0,157,12
         ,6
AB 30270 DATA 202,16,145,76,
         98,228
BK 30280 DATA 104,104,104,17
         0,169,0
JD 30290 DATA 157,24,6,104,1
         57,4
EP 30300 DATA 6,104,157,0,6,
         104
IN 30310 DATA 157,12,6,104,1
         57,8
ID 30320 DATA 6,104,104,157,
         20,6
JH 30330 DATA 169,1,157,16,6
         ,157
LN 30340 DATA 24,6,96,104,17
         0,104
PE 30350 DATA 104,168,169,0,
         153,24
JA 30360 DATA 6,152,10,168,1
         69,0
LF 30370 DATA 153,1,210,202,
         208,237,96
```

Program 2: Sound Effects Demo

```
NG 100 GOSUB 5000
EJ 110 ST=STICK(0):IF ST=15
       THEN 110
JC 120 TX=X+DX(ST-4):TY=Y+DY
       (ST-4)
FH 130 LOCATE TX,TY,Z
QC 140 IF Z=42 THEN 110
GL 150 IF Z=32 THEN COLOR 32
       :PLOT X,Y:COLOR 171:P
       LOT TX,TY:X=TX:Y=TY:F
       OR A=1 TO 25:NEXT A:G
       OTO 110
OB 160 POKE 709,INT(RND(0)*1
       6)*16+INT(RND(0)*3+8)
FP 170 A=USR(QUIET,0,1,2,3)
AB 180 ON Z-16 GOSUB 300,400
       ,500,600,700,800
NF 190 IF STICK(0)=ST THEN 1
       90
FM 200 GOTO 110
OG 300 A=USR(SETSND,0,ADR(S1
       $),LEN(S1$),1)
HE 310 RETURN
OM 400 A=USR(SETSND,0,ADR(S2
       $),LEN(S2$),4)
HF 410 RETURN
BM 500 A=USR(SETSND,0,ADR(S3
       $),LEN(S3$),10)
HG 510 RETURN
OI 600 B=ADR(S4$)
BF 610 A=USR(SETSND,0,8,2,12
       0)
HH 620 A=USR(SETSND,1,8+2,2,
       120)
HL 630 A=USR(SETSND,2,8+4,2,
       120)
HK 640 RETURN
PG 700 A=USR(SETSND,0,ADR(S5
       $),LEN(S5$),5)
HI 710 RETURN
PI 800 A=USR(SETSND,0,ADR(S6
       $),LEN(S6$),4)
HJ 810 RETURN
DM 5000 GRAPHICS 17:POSITION
        2,11:? #6;"DON'T GO
        AWAY..."
OJ 5010 GOSUB 30000
GK 5020 DIM DX(10),DY(10)
GO 5030 DIM S1$(200),S2$(30)
        ,S3$(100)
PD 5040 DIM S4$(6),S5$(24),S
        6$(14)
GL 5050 FOR A=1 TO 10:READ B
        ,C
BL 5060 DX(A)=B:DY(A)=C:NEXT
        A
EF 5070 FOR A=1 TO 199 STEP
        2:S1$(A,A)=CHR$(138)
        :S1$(A+1,A+1)=CHR$(A
        ):NEXT A
AG 5080 FOR A=1 TO 29 STEP 2
        :S2$(A,A)=CHR$(175-A
        /2):S2$(A+1,A+1)=CHR
        $(70):NEXT A
NG 5090 FOR A=1 TO 99 STEP 2
        :S3$(A,A)=CHR$(170):
        S3$(A+1,A+1)=CHR$(A/
        2*5):NEXT A
DM 5100 FOR A=1 TO 6:READ B:
        S4$(A,A)=CHR$(B):NEX
        T A
GO 5110 FOR A=1 TO 24:READ B
        :S5$(A,A)=CHR$(B):NE
        XT A
GP 5120 FOR A=1 TO 14:READ B
        :S6$(A,A)=CHR$(B):NE
        XT A
IE 5500 GRAPHICS 18
LH 5510 POKE 708,136:POKE 71
        0,38:POKE 711,200
ON 5520 COLOR 42:PLOT 0,1:DR
        AWTO 19,1:DRAWTO 19,
        11:DRAWTO 0,11:DRAWT
        O 0,1
FG 5530 COLOR 17:PLOT 3,4:CO
        LOR 18:PLOT 9,3:COLO
        R 19:PLOT 16,4
FO 5540 COLOR 20:PLOT 3,8:CO
        LOR 21:PLOT 9,9:COLO
        R 22:PLOT 16,8
OF 5550 POSITION 0,0:? #6;"
EM 5560 X=9:Y=6:COLOR 171:PL
        OT X,Y
LB 5570 RETURN
PO 6000 DATA 1,1,1,-1,1,0,0,
        0,-1,1,-1,-1,-1,0,0,
        0,0,1,0,-1
FI 6010 DATA 175,181,175,141
        ,175,121
JJ 6020 DATA 42,10,42,50,40,
        12,40,60,38,14,38,70
        ,36,16,36,80,34,18,3
        4,90,32,20,32,100
PO 6030 DATA 204,40,202,50,2
        00,60,198,70,200,60,
        202,50,204,40
```

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HOTWARE: Software Best Sellers

This Month	Last Month	Title	Publisher	Remarks	Systems: Apple	Atari	Commodore	IBM	Macintosh
Entertainment									
1.	5.	*Silent Service*	MicroProse	Submarine simulation	•	•	•	•	
2.	2.	*Ultima IV*	Origin Systems	Fantasy game	•	•	•		
3.	1.	*Elite*	Firebird Licensees	Action/adventure	•		•		
4.		*Hardball*	Accolade	Baseball game	•		•		
5.		*Jet*	SubLogic	Jet simulation			•		
Education									
1.	2.	*Typing Tutor III*	Simon & Schuster	Typing instruction program	•		•	•	•
2.		*Homework Helper: Math Word Problems*	Spinnaker	Math tutorial, high school level	•		•		
3.	4.	*New Improved MasterType*	Scarborough	Typing instruction program	•	•	•	•	•
4.		*Bingo Bugglebee Presents: Home Alone*	Quest Learning Systems	Childhood safety program	•		•		
5.	1.	*Math Blaster!*	Davidson	Introductory math program, ages 6-12	•	•	•	•	
Home Management									
1.	2.	*Print Shop Companion*	Broderbund	Print shop enhancement package	•	•	•		
2.	3.	*The Newsroom*	Springboard	Do-it-yourself newspaper	•		•	•	•
3.		*Three-In-One-Bundle*	Timeworks	Integrated productivity package			•		
4.	1.	*Print Shop*	Broderbund	Do-it-yourself print shop	•	•	•		
5.		*The Newsroom: Clip Art Collection, Vol. 1*	Springboard	Additional graphics	•		•	•	•

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Microscope

Sheldon Leemon

It's difficult to mistake the IBM PC for a home computer, since it's bigger, more expensive, and more complex than the typical home computer. But a lot of changes have been going on in the PC market lately, some of which are bringing IBM and its compatibles much closer to home.

The first change is in price. It's come to the point where you can buy a "generic" PC system with 640K of memory, two 5¼-inch–floppy drives, and a monitor for $600–$700, and prices may go even lower for Christmas. At these prices, such machines are cheaper than some traditional home computers such as the Apple IIc. The inroads the PC compatibles have made into the home market is reflected in the recent increase in nonbusiness-type software for the PC. As prices for PC compatibles spiral downward, there has been some speculation that IBM itself will soon make a serious entry into the home market—or drop out of lower-end retail sales entirely and concentrate on the higher-end AT line.

Even if the price is right, first-time users may not find the PC clones user-friendly enough. But help is on the way. Microsoft, the producer of the PC operating system, seems determined to "Macintize" the PC with its *Windows* software, which provides a mouse-driven user interface with windows, pull-down menus, and icons. Microsoft has been lobbying strongly with the makers of graphics coprocessor chips, display adapter cards, and clones to include *Windows* as an integral part of the hardware design of future MS-DOS machines, and is said to have even included *Windows*' graphics kernel as part of version 5.0 of MS-DOS. Putting *Windows* into hardware would give it the power to run efficiently even on very inexpensive computers, and would help to make such systems accessible to a much wider audience.

* * * * * * * *

The influence of the Macintosh can be seen in the two new computer models that Tandy recently introduced to replace its highly successful model 1000. The first, the 1000SX, is a lot like the old model 1000, only more powerful, and more IBM compatible. But the second new model, the 1000EX, is a more radical departure from the older machine. Designed specifically for the home and educational markets, it's the first true PC compatible that looks like a home computer. It comes in a small one-piece case that includes a nondetachable keyboard and a 5¼-inch disk drive on the side. But this little machine packs a lot of muscle. It comes with 256K RAM, and not only does it run IBM software, but also runs it faster than the XT, since its 8088 processor works at 7.16 MHz in addition to the 4.77-MHz speed that is standard with IBM machines. It has a lot of nice standard features, such as a display adapter, printer port, and a port for additional 5¼-inch or 3½-inch disk drives. There's even space inside for up to three special expansion cards that add features like an additional 384K memory, a clock calendar and mouse, a serial port, or an internal modem. Though the machine can't take full-size expansion cards, no doubt someone will find a way to fit a hard disk card into this little computer.

Just as exciting as the hardware is the *Personal Deskmate* software that comes bundled with the Tandy 1000EX. It includes a word processor, spreadsheet, database, appointment calendar, terminal emulator, and paint program. For ease of use, it features windows, pull-down menus, icons, and file-selector boxes, all of which can be manipulated by a mouse, joystick, or keyboard. Tandy even throws in "pop-up" desk accessories such as a calendar, calculator, notepad, and telephone directory. What's more, the *Personal Deskmate* software has been implemented according to the user-interface guidelines that Microsoft published for its *Windows* environment, making it a first step towards providing a windows-like environment on a home computer.

* * * * * * * *

Manufacturers of the current crop of home computers aren't about to sit back and let PC compatibles take over their turf. Instead, they are readying new computers and adding improvements to older ones. For example, elsewhere in this issue, you'll find a report on the new Apple IIGS. This machine may well uphold Apple's bread-and-butter II series against the onslaught of 16-bit technology. Commodore is taking similar steps to pep up its 8-bit machines, by adding *GEOS*—a new operating system—and RAM-expansion attachments. *GEOS* does a surprisingly good job of adding a windowing environment to the Commodore 64, and Commodore 128 users can expect a version for their computer later this year.

You can now buy a 512K RAM-expansion pack for the 128, and you may well see a version for the 64 in the near future that will substantially upgrade the speed and capabilities of *GEOS*. Atari is rolling along with its ST series, and by the time you read this may have announced the 2080, a 2-megabyte machine that may also include a blitter chip for faster graphics. This machine is said to be the basis for a proposed desktop-publishing station, which will use the vast memory of the computer to drive an inexpensive laser printer. The Unix operating system may also be made available for this machine. ©

Hacker II: The Doomsday Papers

Neil Randall

Requirements: Apple II-series computer with a minimum of 64K, Commodore 64, IBM PC and compatibles, Amiga, Macintosh, and Atari ST computers.

Last year, Activision introduced *Hacker*, a game which proved to be immediately interesting because it had no instructions. The player was faced with a screen that said, simply, "LOGON PLEASE," with no hint of how logging on was to be done. Figuring out what to do—how the game worked and what it required—became as important and as interesting as solving the case.

Hacker II picks up where *Hacker* left off. Once again the cryptic "LOGON PLEASE" opens the game, and once again the transmission is interrupted as you are offered a mission. This time, the mission is to guide an MRU (Mobile Remote Unit) around an intelligence complex in Siberia, searching for a classified file that threatens the security of the United States. Not a very original plot, but *Hacker II* does contain some of the most exciting and harrowing scenarios you'll find in a computer game.

High Security

Once you've received your instructions, the main screen comes up. You see four small monitor screens, each with its own channel selector. At the bottom of the screen is a control panel with several buttons, which you control with mouse or joystick (depending on version). Apart from a bit of typing at critical moments, that's all there is to operating the game. A simple interface, but with a wealth of options.

You choose which screen you want to see, then what you want to do with that screen. You can monitor one of 38 different security cameras scattered throughout the complex, or you can follow the building's security monitoring as it cycles around the cameras. Successfully maneuvering your MRU demands that you bypass the security cameras. To do this, you must make use of the MRU's videotape system. You select the camera, turn on the tape, and synchronize the tape's time to realtime. Once this is set, you hit the Bypass function, and you have fooled the camera by having it view a scene that is actually a few seconds in the past. Your MRU can then slip right by that camera on the way to the next destination.

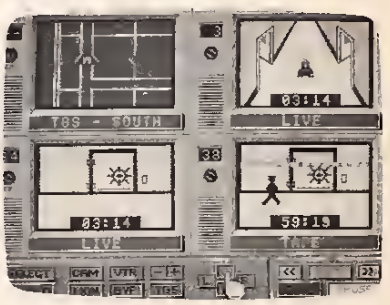
Tricky Business

Even with the ability to bypass cameras, though, the MRU is far from safe. The building has a security guard who patrols the corridors predictably, but thoroughly. If either the guard or a security camera spots the MRU, an alarm sounds and the building sends an "annihilator" to crush the MRU into scrap metal. To make matters worse, some routes will demand that you bypass four cameras at a time, even though you only have three screens to work with (you use the fourth to see where you are going). This means you'll have to stop in a corridor and switch the bypass from one camera to another, all the while hoping you haven't miscalculated the guard's patrol route. As if all this isn't enough, the MRU has a disturbing habit: Somewhere into your journeys, the thing begins to break down.

At first, the MRU's Telemetry Guidance System (TGS) shows the MRU's position on a floor plan of the complex, making navigation easy. Shortly, however, the TGS ceases to function. At that point, you must use the security cameras to watch the MRU move. This sounds easy enough, until you realize that the building has blind spots where no camera can see. This means you cannot be spotted, but it also means you cannot see where the MRU is going. With the guard on patrol, getting lost in the corridors is a sure way of bringing on the annihilator.

Nerves Of Steel

Your goal is to find and open four filing cabinets, each of which yields part of the combination to the vault containing



the file you're after. Once you figure out the combination and shut off the vault alarms, though, the real work begins. Cracking the vault, the climax of everything you've been working for, demands a sound knowledge of all you have learned about your MRU. Here you must use all four of your screens to bypass the vault's cameras, which means you have none left to watch the MRU move. You aren't even able to bypass a fifth camera, which you must slip by on your way. After setting three cameras on bypass, you use the fourth to monitor the guard's path *and* to keep watch on the pattern of the security cameras. Then, at that precise moment, you must bypass the fourth camera, blindly maneuver the MRU to the vault, get the file, and blindly maneuver back to safety. The hit on the vault demands planning, speed, luck, and perhaps more than all of these, nerves of steel.

Despite the fine graphics, the excellent interface, and the wealth of detail, what sets *Hacker II* apart is its ability to inspire paranoia and anxiety in the player. At every point, you wait for the sound of the detection alarm. The game is so intense that when the MRU's movement is interrupted by a message telling you of problems with the machine, you are startled, thinking you have been spotted. Similarly, the attempt on the vault is so risky that for sheer excitement it is practically unparalleled in computer games.

I have a few quibbles, however. First, there is no Save Game feature, which means you must try the whole mission in one sitting. Second—and here I don't want to give anything away—successfully retrieving the file

does not end the game. The vault incident is so perfectly climactic that anything beyond it is almost annoying. It would have been preferable, I think, to allow the game to be replayed, each time with the filing cabinets in different locations and containing different information. Even the guard's route could have been varied. All of this would have made the game endlessly replayable.

But *Hacker II* is a fine effort nevertheless. It will take a while to get started, but once the learning is out of the way, the game has much to offer. I recommend it to anyone who enjoys a game that rewards patience and skill, especially if they like the espionage genre as well. I do not recommend it to anyone with a weak heart.

Hacker II: The Doomsday Papers
Activision
2350 Bayshore Frontage Rd.
Mountain View, CA 94043
$39.95 (Apple II and Commodore 64)
$49.95 (IBM PC and compatibles, Tandy 1000, Amiga, Macintosh, Atari ST)

Chessmaster 2000

James V. Trunzo

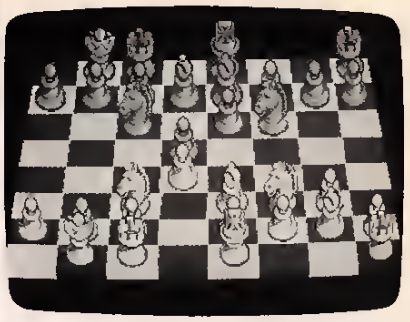
Requirements: Apple II-series computers with a minimum of 64K, Amiga, Atari XL-series computers, Atari ST, Commodore 64, IBM PC and compatibles, and Macintosh computers.

In late July, the United States Chess Federation held its annual competition to determine the top chess players and computer chess programs in the country. At the close of the grueling competition, *Chessmaster 2000* claimed sovereignty over such established computer chess programs as *Sargon III* and *MyChess 2.0*. In the process of earning an unofficial rating of 2000 (Grandmaster ranking), *Chessmaster 2000* also overcame the Cray *Blitz* mainframe chess program, long the standard in chess simulations. Perhaps *Chessmaster 2000* accomplished this feat by virtue of its 71,000-move opening library; or perhaps its midgame play, allowing the program to think a dozen moves ahead, was the reason for its success. Whatever the reason, it should suffice to say that *Chessmaster 2000* is a formidable opponent, no matter who sets up the pieces and issues a challenge. Still, I—your humble reviewer—with an unofficial rating of 0020 (Grandturkey ranking), beat it.

If the above seems to be a bit of a paradox, it should be noted that I had preset the difficulty of play to Level 0, EASY MODE, only slightly higher than the "Coffeehouse" level, which plays a very "relaxed and casual game" to be kind. The preceding examples of playing range represent, obviously, one of the best features of *Chessmaster 2000*: It truly can be played by the total novice or the consummate chess player with no loss of features or enjoyment. And while *Chessmaster 2000* can make a move in as little as five seconds or in as long as two hours, its average move at midlevel takes only two minutes, and it plays, at that level, a game of chess that only superior players will be able to beat.

Many Options

Containing all the features that are now accepted as standard in a chess simulation (take-back moves, computer as referee, computer-vs.-computer play, displayed list of moves, and so on), *Chessmaster 2000* goes beyond the standards to give the user even more in the way of options. These include outstanding graphics in either the 2-D or 3-D mode, although it must be noted that on standard eight-bit machines, the pieces in the 3-D modes, while attractive, are difficult to distinguish when clustered together. No such problem exists on the Macintosh, Atari ST, or Amiga. *Chessmaster 2000* also provides



mouse, keyboard, or joystick input; an outstanding library of 100 classic games that can be viewed or replayed; ability to print the game while playing or after completion; 90-degree rotation of the 3-D board, enabling you to see the board from every angle; an extensive list of chess problems to solve; and even a coupon for a discount membership in the U.S. Chess Federation.

When you're using *Chessmaster 2000* on an Amiga, Atari ST, or Macintosh, you'll find that no sacrifices have been made, the program giving the user every conceivable option and graphics feature possible. On eight-bit machines (64, Atari XE, Apple IIe and IIc, for example), one or two compromises were necessary. In the 3-D mode, for example, the helpful chess notation borders are not available. Software

Toolworks decided to sacrifice this feature in favor of retaining total sophistication of play. Onscreen chess clocks were also omitted, for the same reason, on some eight-bit machines. This reviewer agrees with the company's decision to maintain the advanced play algorithms in favor of a few frills.

It goes without saying that *Chessmaster* 2000 is now the yardstick by which other similar programs will be measured. It certainly deserves any accolades that it receives.

Chessmaster 2000
Software Toolworks
Santa Monica Blvd., Ste. 214
Beverly Hills, CA 90210
distributed by Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
$39.95 (Apple II, 64, Atari XL, and IBM versions)
$44.95 (Amiga, Atari ST, and Macintosh versions)

The Music Studio
For Amiga And Atari ST

Stefan Lipson

Requirements: Amiga and Atari ST computers with 512K minimum memory; versions also available, with slightly different features, for Commodore 64, Atari 800/XL/XE, IBM PCjr, and Tandy 1000 computers. Only Amiga and ST versions are included in this review.

The Music Studio from Activision is among the first of what promises to be a host of sophisticated music programs becoming available for the Commodore Amiga and Atari ST computers.

It's an easy-to-use program, featuring pull-down menus and icons which are selected with a click of the mouse. The documentation consists of a small booklet explaining the available features as they are offered on both the Amiga and the Atari ST versions. Although the documentation does not include an index, it's straightforward enough to guide you quickly through the software.

The program itself offers five basic screens from which to work. The Composition screen displays a treble and bass clef. Several icons appear along the border of the screen which allow you to adjust the volume, speed, time signature, and key in which the composition is to be played. You move the mouse to the note icon, select the type of note or rest to be placed on the staff, move the mouse pointer to the desired location on the staff, and fix the note in place with a click of the mouse. An ear icon in the lower left-hand corner will, when selected, play the piece as it is written.

The Composition screen allows you to use any of 15 different sounds, or *presets*, which are included with the program. The different sounds, including bassoon, French horn, harmonica, and jazz guitar, are each represented by a different color. When you select the bassoon, for example, the notes appear on the staff in green. The notes for the French horn appear in blue, and so on.

Since the Amiga allows you to play four different parts simultaneously, the color-coded notes help you to distinguish clearly among the four tracks being played. Lyrics can also be inserted within the score.

The Composition screen includes a pull-down menu with options which allow you to cut, paste, delete, copy, and otherwise rearrange what you have written. You can even hear the score played back in half-time or double-time.

Designing Your Own Sounds

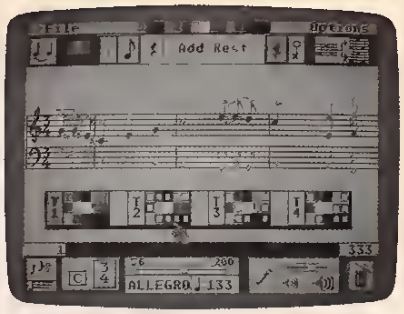
If you aren't satisfied with the sound presets, you can create your own with the Instrument Design screen. This screen lets you create a library of your own sounds or alter any of the 15 sounds provided. On the Amiga, the Instrument Design screen displays the wave forms of any 7 of 33 possible harmonics, and these may be altered individually or as a group. (The Atari screen is slightly different, appearing more like the control panel on an early-model synthesizer.) The amplitude, decay time, and sustain time of each wave can be adjusted. The newly created sound can then be tested with the push of a button. If you like the sound, you can save it, and if you aren't satisfied with it you can either discard the sound or retain the sound you previously had.

If you don't read music and don't want to wrestle with standard musical notation, *The Music Studio* also offers the Music Paintbox screen. This appears as a music staff, but the mouse acts as a paintbrush laying down colors rather than standard musical notation. Each color represents a different instrument and the user simply paints each color on the screen as he or she sees fit. The graphics for this are not exceptional, however, and to be perfectly honest, users who can't read music will probably find creating music with standard notation to be of greater interest.

Using The Program With MIDI

The Music Studio can also be used with a MIDI (Musical Instrument Digital Interface) keyboard. An external MIDI keyboard (*The Music Studio* was written with the Casio CZ101 synthesizer in mind) requires a MIDI interface which, of course, is not provided with the *Studio* program. The interface allows you to write a composition and play it on the Casio, for example, using the sounds provided within the Casio synthesizer. *The Music Studio* has also been tested with the Casio CZ3000 and Yamaha DX-7 keyboards, the RX-15 drum machine, and the TX-7 synthesizer.

When working with the Composition screen, you may also print out your score with any standard plotter or printer (one staff only). If you're using more than one instrument at a time, however, don't forget that the colors will not appear on a black-and-white printer. This is important since *The Music Studio* only prints one staff. And the color-coded distinction between the different tracks is lost.



If you want to get a feel for what *The Music Studio* is capable of, the software includes a number of prewritten tunes which illustrate its features. By selecting a tune from the song library, a transcribed version of the song will appear onscreen as the tune is played.

The Amiga version of *The Music Studio* does not include a drum sound in its library, and the absence of a noise generator makes it impossible to create one with the Instrument Design screen. (However, the program can be used with a drum machine through a MIDI connection.) Also, if you're interested in using *The Music Studio* as a real-time keyboard (that is, playing the keyboard and hearing the music when you press the keys), then look for another program. *The Music Studio* does not provide this option.

To briefly summarize, *The Music Studio* is an easy-to-use, full-featured music composition program that can be used effectively by both beginning and experienced musicians.

The Music Studio
Activision
2350 Bayshore Frontage Rd.
Mountain View, CA 94043
$59.95 (Amiga and Atari ST)
$49.95 (IBM PCjr and Tandy 1000)
$34.95 (Commodore 64 and Atari 800/XL/XE)

Unnew

Dennis J. Jarvis and Michael L. Zinicola

This tiny, but powerful program for the Commodore 128 and 64 allows you to resurrect a BASIC program after an inadvertent NEW command or system crash. Although it's written in machine language, you can use "Unnew" even if you're not a machine language programmer.

It's happened to virtually every BASIC programmer. You type NEW and press RETURN without thinking, only to realize that you forgot to save the program in memory. If you don't have a backup copy, that small slip can mean hours of wasted effort. However, NEW doesn't actually erase the program from memory—it only resets the computer's BASIC pointers so that no program appears to be present. Nothing appears when you LIST the program, but all of the program lines still remain in memory. To resurrect the program, you need only reset the computer's BASIC pointers so that it recognizes the program's existence again.

"Unnew" automatically restores any BASIC program after an accidental NEW. It can also recover many programs which appear to be lost as the result of a system crash. We've included two versions, one for the Commodore 64 and one for the 128. If you have a 64, type in and save Program 1. If you have a 128, type and save both programs.

Both programs are BASIC loaders which write a machine language program to disk. To use either program, load it, type RUN, and press RETURN. Program 1 creates a disk file named UNNEW 64.OBJ. Program 2 creates a disk file named UNNEW 128.OBJ. If the loader program detects a typing error, it deletes the file from disk and displays an error message instructing you to check for errors. If no errors occur, the program asks whether you wish to create another copy of the machine language program. In this way, you can create as many copies of Unnew as you need. After you've created the machine language files on disk, you don't need the BASIC programs again (unless you need to make additional copies of the machine language files).

Resurrecting BASIC

Apart from an accidental NEW, there are many different ways that a program can seem to disappear. For instance, a programming error may cause the computer to *lock up*, or fail to respond to the keyboard. When this happens, you can often regain control and return the computer to BASIC ready mode by pressing the RUN/STOP and RESTORE keys together. If you can list the program after pressing RUN/STOP–RESTORE, you may not need to use Unnew at all. Save a backup copy of the program before doing anything else.

The instructions for using Programs 1 and 2 are different. We'll begin with the 64 version, Program 1. The 64 version works on the 64 and on the 128 in 64 mode. To use this program, you must be able to return the computer to ready mode. If the 64 seems to be locked up, try pressing RUN/STOP–RESTORE. If you're using a 128 in 64 mode and RUN/STOP–RESTORE does not work, press the reset button while holding down the Commodore key. Once the 64 has returned to ready mode, type this command and press RETURN:

```
LOAD "UNNEW 64 .OBJ",8,1
```

When the program has finished loading, type this command and press RETURN:

```
SYS 828
```

After the ready prompt appears, you should be able to list and save the program as usual.

The 128 has a reset button that can be very useful in recovering a program. If the computer seems to lock up and RUN/STOP–RESTORE does not return you to ready mode, hold down RUN/STOP and press

the reset button located on the right side of the computer. This operation resets the 128 and places you in the built-in machine language monitor. To exit the monitor and return to BASIC, type X and press RETURN. Try to list the program; if it can be listed, save a backup copy immediately.

Unnew is needed only for cases in which nothing appears when you list the program. After you return the computer to ready mode, place the disk containing UNNEW 128.OBJ in the drive. Then type this command and press RETURN:

```
BOOT"UNNEW 128 .OBJ"
```

The 128 automatically loads UNNEW 128.OBJ from disk and runs it. When the process is complete, the computer prints READY as usual. List the program to confirm that it has been recovered; then save it as usual. This procedure should work even in cases when the 128 has relocated the program during graphics operations.

How Unnew Works

You can use Unnew to recover programs without knowing how it works. However, an explanation of the technique will also illustrate something about how the computer stores BASIC programs. The usual starting address for a BASIC program is location 7168 ($1C00) on the 128 or location 2048 ($0800) on the 64. The first location in BASIC program space must always contain a zero to mark the beginning of BASIC text. Commodore BASIC programs are stored in memory line by line, in ascending order. At the beginning of each line is a two-byte *link address*, in low-byte/high-byte format, which tells the computer where the next program line begins in memory. Among other things, this linking scheme allows the computer to quickly scan through the program when it performs operations such as GOTO and GOSUB, which refer to a specific program line.

The next portion of the program line contains the line number. The line number is stored in two bytes, also in low-byte/high-byte format. Following the line number are the tokenized BASIC keywords and other characters that make up the rest of the program line. The end of each line is marked with a byte containing zero. This sequence of links, line numbers, program text, and zero markers continues until the last program line is reached. The last line contains another special marker: Instead of a link address, you'll find two zero bytes which indicate the end of BASIC program text.

When you perform NEW, the computer stores two zero bytes immediately after the zero that marks the start of BASIC. When it finds two zeros in these locations instead of a non-zero link address, the computer concludes that there is no program in memory (the end-of-program marker coincides with the start-of-program marker, so the program text consists of nothing). In addition, it resets separate pointers that mark the end of program text and the beginning of variables.

On the Commodore 64, BASIC variables are stored in the same general area as the program, beginning immediately above the end of the program. Thus, a single pointer is used to mark where program text ends and variable storage begins. On the 128 (in 128 mode), variables are stored in a different memory bank. However, the computer still maintains a pointer to the end of program text so that it knows where to stop when saving the program.

To restore a program after NEW, you must put a nonzero link address at the beginning of the program and reset the end-of-program pointer to point to the actual end of the program. In a nutshell, that's how Unnew works. More specifically, it begins by turning on the ROMs and the character generator (just in case a program crash turned them off). Then it decrements the start-of-BASIC pointer by one and stores a zero in that location. This insures that the computer will find a zero in the first byte of BASIC program space. Then it adds one to the pointer and stores a nonzero value in the two bytes that form the first line's link address. Once this has been done, the program calls an internal ROM routine that corrects all the program's line link addresses. Finally, it resets the end-of-program pointer to point to the true end of program text and ends by printing the usual READY prompt.

Worst-Case Scenario

Of course, there are some program crashes which Unnew can't fix. The 128 can always recover from a crash via the reset button. But if the crash POKEd garbage values into the program area, the program text may be irreparably garbled. That's why it's important to list the program after recovering it with Unnew, to make sure that the entire program is intact. The 64 does not have a reset button, and may be unable to recover from a hard crash—when the system locks up completely and cannot be recovered with RUN/STOP–RESTORE. To see what is meant by a hard crash, type this line and press RETURN (before you do so, make *sure* that you save any program that's in memory):

```
POKE 1,52
```

This POKE turns off the 64's BASIC and Kernal ROMs, making it impossible to use the computer at all. Unnew cannot be used, since you must be able to enter direct mode commands to load and activate the program. Unless you've installed a hardware reset switch, you have no recourse but to turn the power off and on. Once the power is turned off, the contents of memory are lost completely.

For instructions on entering these listings, please refer to "COMPUTE!'s Guide to Typing In Programs" in this issue of COMPUTE!.

Program 1: Commodore 64 Unnew

```
PM 10 POKE 53280,1:POKE 53281,
      0:POKE646,1
JQ 20 PRINTCHR$(147):E=0:GOSUB
      210:C=0
FR 30 OPEN15,8,15,"I0:":OPEN1,
      8,8,"UNNEW 64 .OBJ,P,W"
GX 40 FORI=1TO38:C=C+1:IFC=15T
      HENC=1
BH 50 :READA:CK=CK+A
XK 60 ::INPUT#15,EN,EM$,ET,ES:
      IF EN<>0THENE=1:GOSUB210
AC 70 IF E=0THEN90
GX 80 PRINT:PRINT"OISK ORIVE E
      RROR{3 SPACES}"EM$:ENO
QA 90 :POKE53281,C:POKE 53280,
      C
OH 100 PRINT#1,CHR$(A);
KS 110 NEXT:POKE53281,0:POKE53
       280,0:CLOSE1:PRINT#15,"
       I0:":CLOSE15:PRINTCHR$(
       147)
```

```
RG 120 IFCK<>3682THEN POKE5328
       0,2:POKE53281,2:GOTO140
PP 130 GOTO150
RC 140 PRINT:PRINT"CHECKSUM ER
       ROR, CHECK YOUR DATA ST
       ATEMENTS":E=1:GOSUB210:
       END
AF 150 A$="":PRINTCHR${147}
CX 160 PRINT"COMPLETED WOULD Y
       OU LIKE TO SAVE THIS
       {3 SPACES}TO ANOTHER DI
       SK? {Y/N)"
BB 170 GET A$:IF A$=""THEN 170
DQ 180 IF A$<>"Y"THEN END
AP 190 RUN
XR 200 IFE=0THENPRINTCHR${147)
RX 210 CLOSE1:OPEN15,8,15,"I0:
       ":CLOSE15
PA 220 PRINT:PRINT"SCRATCHING
       {SPACE}UNNEW 64 .OBJ
       {5 SPACES}":OPEN15,8,15
       ,"S0:UNNEW 64 .OBJ"
ED 230 PRINT#15,"I0:":CLOSE15:
       IFE=1THEN RETURN
PK 240 PRINT:PRINT"CREATING UN
       NEW 64 .OBJ ON THIS DIS
       KETTE":RETURN
DK 250 REM
FQ 260 REM{2 SPACES}OPCODE
       {11 SPACES}SOURCE CODE
       {3 SPACES}COMMENTS
RS 270 REM{2 SPACES}------
       {11 SPACES}------ ----
       {3 SPACES}--------
XP 280 REM
RB 290 DATA 060,003{5 SPACES}:
       REM{2 SPACES}ORG $033C
       {5 SPACES}PROGRAM START
       ING ADDRESS
MP 300 DATA 169,000{5 SPACES}:
       REM{2 SPACES}LDA #00
       {7 SPACES}END OF BASIC
       {SPACE}LINE FLAG
RP 310 DATA 168{9 SPACES}:REM
       {2 SPACES}TAY
       {11 SPACES}ZERO THE IND
       EX POINTER
AR 320 DATA 198,043{5 SPACES}:
       REM{2 SPACES}DEC $2B
       {7 SPACES}SET PROGRAM S
       TART TO PROGRAM START-1
JE 330 DATA 145,043{5 SPACES}:
       REM{2 SPACES}STA {$2B),
       Y{3 SPACES}SET END OF B
       ASIC LINE FLAG
GH 340 DATA 230,043{5 SPACES}:
       REM{2 SPACES}INC $2B
       {7 SPACES}RESTORE PROGR
       AM STARTING ADDRESS
CJ 350 DATA 169,001{5 SPACES}:
       REM{2 SPACES}LDA #$01
       {6 SPACES}PSEUDO LINE L
       INKS
QP 360 DATA 145,043{5 SPACES}:
       REM{2 SPACES}STA {$2B),
       Y{3 SPACES}SAVE AS PSEU
       DO LINE LINK LSB
XP 370 DATA 200{9 SPACES}:REM
       {2 SPACES}INY
       {11 SPACES}INCREMENT IN
       DEX POINTER TO MSB
QG 380 DATA 145,043{5 SPACES}:
       REM{2 SPACES}STA {$2B),
       Y{3 SPACES}SAVE AS PSEU
       DO LINE LINK MSB
MC 385 DATA 032,051,165 :REM
       {2 SPACES}JSR $A533
       {5 SPACES}RELINK THE BA
       SIC LINES
SR 390 DATA 24{10 SPACES}:REM
       {2 SPACES}CLC
       {11 SPACES}CLEAR CARRY
       {SPACE}FOR ADDITION
KA 391 DATA 165,034{5 SPACES}:
       REM{2 SPACES}LDA $22
       {7 SPACES}GET LSB OF TH
       E LAST LINE LINK
PF 392 DATA 164,035{5 SPACES}:
       REM{2 SPACES}LDY $23
       {7 SPACES}GET MSB OF TH
       E LAST LINE LINK
XB 393 DATA 105,002{5 SPACES}:
       REM{2 SPACES}ADC #2
       {5 SPACES}MOVE PAST THE
       MSB OF THE LAST LINE L
       INK
XD 394 DATA 144,001{5 SPACES}:
       REM{2 SPACES}BCC ORG+29
       {4 SPACES}IF NO, CARRY
       {SPACE}OVER FROM ADDITI
       ON BRANCH
ED 395 DATA 200{9 SPACES}:REM
       {2 SPACES}INY
       {11 SPACES}CARRY OVER,
       {SPACE}ADD ONE TO MSB
PM 400 DATA 133,045{5 SPACES}:
       REM{2 SPACES}STA $2D
       {7 SPACES}SAVE THE END
       {SPACE}OF THE PROGRAM
AH 401 DATA 132,046{5 SPACES}:
       REM{2 SPACES}STY $2E
       {7 SPACES}POINTERS FOR
       {SPACE}SAVE ETC..COMMAN
       DS
BR 410 DATA 076,116,164 :REM
       {2 SPACES}JMP $A474
       {5 SPACES}PRINT 'READY.
       ' TO THE SCREEN
```

Program 2: Commodore 128 Unnew

```
QG 10  COLOR0,1:COLOR1,2:COLOR4
       ,1:COLOR6,13:COLOR5,4
BA 20  IFRGR{0)=5THEN FAST:X=23
       :ELSE SLOW :X=0
CX 30  E=0:SCNCLR:GOSUB150:C=0
CP 40  DCLEARD0,U8:DOPEN#1,"UNN
       EW 128 .OBJ,P",D0,U8,W
DM 50  FORI=1TO30:C=C+1:IFC=15T
       HENC=1
XG 60  :READA$:A=DEC{A$)
JP 70  ::IFDS<>0THEN E=1:GOSUB1
       50:PRINT"DISK DRIVER ERR
       OR{3 SPACES}"DS$:END
SH 80  ::CK=CK+A
KG 90  :COLOR6,C:COLOR0,C
DH 100 PRINT#1,CHR${A);
SA 110 NEXT:COLOR6,7:COLOR0,7:
       DCLOSE:DCLEARD0,U8:SCNC
       LR
KS 120 IFCK<>2844THEN COLOR6,3
       :COLOR0,3:CHAR1,X,10,{C
       HR${15)+"CHECKSUM ERROR
       , CHECK DATA STATEMENTS
       "):E=1:GOSUB150:END
PC 130 X$="":SCNCLR:CHAR1,1,12
       ,"COMPLETED WOULD YOU L
       IKE TO SAVE THIS
       {2 SPACES}TO ANOTHER DI
       SK? {Y/N)":GETKEYX$:IFX
       $<>"Y"THEN END: ELSE RU
       N
GS 140 IF E=0 THEN SCNCLR
CR 150 DCLOSE: DCLEARD0,U8:CHA
       R1,X,12,"SCRATCHING UNN
       EW 128 .OBJ{8 SPACES}":
       SCRATCH"UNNEW 128 .OBJ"
       ,D0,U8:IFE=1THENRETURN
XK 160 IFVAL{RIGHT${DS$,5)) >
       {SPACE}0THENCHAR1,X,12,
       "UNNEW 128 .OBJ WAS SCR
       ATCHED":SLEEP2:ELSE CHA
       R1,X,12,"UNNEW 128 .OBJ
        WAS NOT FOUND
       {11 SPACES}" :SLEEP2
FA 170 CHAR1,X,12,"CREATING UN
       NEW 128 .OBJ ON THIS DI
       SKETTE{2 SPACES}":RETUR
       N
CF 180 REM
CJ 190 REM{2 SPACES}OPCODE
       {11 SPACES}SOURCE CODE
       {3 SPACES}COMMENTS
BD 200 REM{2 SPACES}------
       {11 SPACES}------ ----
       {3 SPACES}--------
DG 210 REM
XP 220 DATA 00,0B{6 8PACES}:RE
       M{2 SPACES}ORG $0B00
       {5 SPACES}PROGRAM START
       ING ADDRESS
QB 230 DATA 8D,03,FF{3 SPACES}
       :REM{2 SPACES}STA $FF03
       {5 SPACES}TURN ON KERNA
       L AND BASIC ROMS,RAM BA
       NK 0, AND CHARACTER GEN
       ERATOR
MJ 240 DATA A9,00{6 SPACES}:RE
       M{2 SPACES}LDA #00
       {7 SPACES}END OF BASIC
       {SPACE}LINE FLAG
EG 250 DATA A8{9 SPACES}:REM
       {2 SPACES}TAY
       {11 SPACES}ZERO THE IND
       EX POINTER
SD 260 DATA C6,2D{6 SPACES}:RE
       M{2 SPACES}DEC $2D
       {7 SPACES}SET PROGRAM S
       TART TO PROGRAM START-1
JK 270 DATA 91,2D{6 SPACES}:RE
       M{2 SPACES}STA ($2D),Y
       {3 SPACES}SET END OF BA
       SIC LINE FLAG
GQ 280 DATA E6,2D{6 SPACES}:RE
       M{2 SPACES}INC $2D
       {7 SPACES}RESTORE PROGR
       AM STARTING ADDRESS
XX 281 DATA A9,01{6 SPACES}:RE
       M{2 SPACES}LDA #$01
       {6 SPACES}PSEUDO LINE L
       INKS
KF 290 DATA 91,2D{6 SPACES}:RE
       M{2 SPACES}STA ($2D),Y
       {3 SPACES}SAVE AS LINE
       {SPACE}PSEUDO LINE LINK
        LSB
XH 300 DATA C8{9 SPACES}:REM
       {2 SPACES}INY
       {11 SPACES}INCREMENT IN
       DEX POINTER TO MSB
AK 310 DATA 91,2D{6 SPACES}:RE
       M{2 SPACES}STA ($2D),Y
       {3 SPACES}SAVE AS LINE
       {SPACE}PSEUDO LINE LINK
        MSB
SX 320 DATA 20,4F,4F{3 SPACES}
       :REM{2 SPACES}JSR $4F4F
       {5 SPACES}RELINK THE BA
       SIC LINES
KX 330 DATA 20,B2,4F{3 SPACES}
       :REM{2 SPACES}JSR $4F82
       {5 SPACES}PLACE THE END
        INTO END OF TEXT POINT
       ERS
CB 340 DATA 4C,37,4D{3 SPACES}
       :REM{2 SPACES}JMP $4D37
       {5 SPACES}PRINT 'READY.
       ' TO THE SCREEN
```

EDIT For Apple II

E. Joseph Billo
Richard A. DeJordy

This short utility improves the editing abilities of Apple II–series computers using DOS 3.3.

The shortcomings of the Apple's BASIC editor, designed in the infancy of personal computing, are familiar to every Apple owner. If you're a dedicated programmer, you've probably typed POKE 33,33 more times than you care to count. For those who aren't familiar with this command, here's a brief recap of what it does. The usual procedure for editing a BASIC line is to LIST the line, then use ESC and the arrow keys to position the cursor for editing. Although BASIC lists the line in a width of 33 columns, the cursor can travel across the entire 40-column width of the screen. If the line you're editing contains a string that wraps around from one screen line to the next, the editor inserts several extra blank spaces in the string at the place where it wraps. To avoid this unwanted effect, experienced programmers often enter POKE 33,33 before listing the line, to limit the width of the screen window to 33 columns.

In short, the built-in editor demands several steps just to place the cursor at the beginning of the line you wish to edit. First you need to enter POKE 33,33, followed by as many cursor movements as are needed to reach the desired line. "EDIT for Apple II" eliminates the need for such contortions by adding a new command to DOS 3.3.

Typing The Program

Type in the program and save it with the filename HELLO on a disk containing DOS 3.3. When you boot the computer with that disk, the HELLO program automatically installs the EDIT command in DOS 3.3. (Note that any previously formatted DOS 3.3 program will already contain a HELLO program. This program will replace any existing HELLO program, so you should not store this program on any disk which contains a HELLO program you wish to keep.)

To edit a line, simply type EDIT followed by the desired line number. The computer sets the screen width to 33 columns, lists the line, and positions the cursor on the first digit of the line number, ready for editing. If you follow the EDIT command with a range of line numbers (for instance, EDIT 100–120), it displays the range of lines indicated for your reference.

Adding A New DOS Command

One advantage of this program is that it doesn't decrease the amount of memory available for programs. Rather than add a new command, it replaces INT, an existing DOS command. To accomplish this, it's necessary to substitute a new command name for the name INT in the *command name table*, change the address of the command handler routine in the *command handler entry point table*, and change the keyword flag bytes in the *command valid keywords table*.

Perhaps the greatest obstacle faced in making EDIT a DOS command is that the DOS syntax checker doesn't accept any DOS command followed by a number in the range required for line numbers (0–63999). A few commands, such as PR# and MAXFILES, can include numbers, but only within a restricted range.

How, then, to trick DOS into accepting a command followed by a number like 1000? The solution used in this case is to make DOS think it's accepting a filename—something that begins with a letter of the alphabet instead of a number. The new command stored in the command name table is EDI (without a T). When the command parser sees the command EDIT 1000, it interprets it as the command EDI followed by the filename T 1000. Since the first character isn't a numeric digit, the parser lets it pass. The reason for selecting INT is that its three letters can be replaced by EDI without disturbing the rest of the DOS command table.

The simplest way to pass control to the BASIC LIST command handler, along with the line number, is to fool BASIC as well. Before

passing control to BASIC, the EDIT program scans the input buffer ($200–$2FF) where the characters EDIT 1000 are located, and changes the command EDI to LIS. Then control is passed to BASIC, where the BASIC syntax checker sees LIST 1000 and proceeds to list the line.

The following table lists the DOS 3.3 and monitor subroutines used in the program. The machine language code for the EDIT command is stored in an area that otherwise contains most of the DOS INIT command. As a result, you can't initialize an unformatted disk when EDIT is in place.

DOS And Monitor Routines

$3DA	DOS 3.3 entry point vector for routine that updates monitor I/O routines.
$A012	Exit DOS command parser if command not found in DOS command name table (command must be BASIC).
$A22B	Alternate entry point to DOS command handler for PR# command. Executes PR#S (S in A-register).
$FC22	Monitor subroutine to perform VTAB to row specified in cursor vertical ($25).
$FDF0	Monitor subroutine COUT1. Prints character in A register to screen.

EDIT For Apple II

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" in this issue of COMPUTE!.

```
4E 10 REM :::GREETING PROGRAM TO
     INSTALL EDIT
D9 20 POKE 43249,69: POKE 43250,
     68: POKE 43251,201: REM ::
     :'EDI'
5F 30 POKE 40268,147: POKE 40269
     ,174: REM :::ADDRESS
52 40 POKE 43319,32: POKE 43320,
     112: REM :::VALID KEYWORDS
7C 50 POKE 40222,207: POKE 40223
     ,3: REM :::DISABLE INIT CO
     MPLETELY
8D 60 FOR X = 44692 TO 44796: RE
     AD C: POKE X,C: NEXT
A8 100 DATA 169,193,133,54,169,1
     74,133,55,32,234,3,162,0,
     134,255,169,33,133,33,133
     ,253,160,2,202,232,189,0,
     2,217,247,174,208
E8 110 DATA 247,185,250,174,157,
     0,2,136,16,238,76,18,160,
     133,254,201,221,240,11,16
     5,36,208,2,230,255,165,25
     4,76,240,253,169,40
35 120 DATA 197,253,240,17,133,2
     53,166,255,198,37,202,208
     ,251,165,37,16,15,169,23,
     133,37,169,40,133,33,169,
     0,32,43,162,208,217
C3 130 DATA 76,34,252,201,196,19
     7,211,201,204                ©
```

SpeedView

An 80-Column Preview Program For *SpeedScript*

Mark Schreiner

"SpeedView," an enhancement for COMPUTE!'s Commodore 64 SpeedScript *word processor (versions 3.0 and higher), provides 80-column previewing of text before the actual printing. Using 4 × 3 high-resolution blocks, the program shows exactly how each page of the document will look when printed. A disk drive is required to create the combined file containing both* SpeedScript *and SpeedView.*

SpeedScript, COMPUTE!'s popular word processor, becomes an even more useful resource with this program. "SpeedView" lets you preview your text file in 80 columns so you can see precisely how a printout of your document will look.

Typing It In

Program 1 is a BASIC loader which creates SpeedView. Type in and save the program; then run it. When the program asks for a filename, enter the name you wish to use for the machine language program.

To use SpeedView, load *SpeedScript* but *do not run it yet*. Next, load SpeedView with the command LOAD"SPEEDVIEW",8,1, replacing SPEEDVIEW with the name you used when creating the program (tape users should substitute ,1,1 for ,8,1 in this command). Finally, type SYS 9480 and press RETURN. This command activates *SpeedScript* with the SpeedView enhancement.

Two For One

If you plan to use SpeedView regularly, you have the option of creating a combined file which contains both *SpeedScript* and SpeedView. Like *SpeedScript*, the unified file loads and runs just like an ordinary BASIC program. To create this file, type in and save Program 2. Reset the computer by turning it off and on; then enter this command and press RETURN:

```
POKE 44,48:POKE 48*256,0:NEW
```

Load Program 2 back into memory and insert a disk containing copies of both *SpeedScript* and SpeedView. When you run Program 2, it asks you to enter the names of the *SpeedScript* and SpeedView files on the disk in the drive. After you've entered these

filenames, you are prompted to enter a name for the new, combined file. Program 2 reads both files into memory, modifies the BASIC portion of *SpeedScript*, then writes the unified package back to disk using the filename you selected.

To use this combined program, load and run it as you would any BASIC program. You now have a copy of *SpeedScript* with SpeedView permanently installed.

SpeedView Operation

To use SpeedView, press CTRL-SHIFT-P, followed by S, the command sequence to direct *SpeedScript*'s output to the screen. Instead of the usual jumble of scrolling lines, SpeedView presents a neatly formatted representation of the document's first page. Press RETURN to view succeeding pages. SpeedView shows exactly how each page will look when printed on paper. When the last page has been displayed, press any key to return to *SpeedScript*. The screen preview option is the only *SpeedScript* command changed by SpeedView. All others function normally.

You should never press RESTORE while previewing a document with SpeedView. If you must exit *SpeedScript*, press RETURN until you have reached the end of the SpeedView display and return to *SpeedScript*; then press RESTORE to exit. If you do not use the combined file, remember that the proper sequence is to load *SpeedScript*, load SpeedView, then activate SpeedView with the SYS command described above.

Some printkey values may not show up during the 80-column preview. SpeedView displays only those characters whose Commodore ASCII values are in the range of 32–90, or 193–218, inclusive. This includes the upper and lowercase alphabets, numerals, and punctuation marks. The SpeedView program code occupies 1.5K of space that's otherwise available for text memory. As a result, you may not be able to preview a very long document without breaking it into two smaller files. SpeedView behaves erratically if you change the page length to any value other than 66, or the right margin to any value greater than 80. To obtain the best results, make sure to use those settings.

For instructions on entering these listings, please refer to "COMPUTE!'s Guide to Typing In Programs" in this issue of COMPUTE!

Program 1: SpeedView

```
SB 100 OPEN15,8,15
FX 110 INPUT "FILENAME FOR SPE
       EDVIEW FILE";F$:IF LEN(
       F$)=0 THEN CLOSE 15:END
DG 120 OPEN 2,8,2,F$+",P,W"
XP 130 INPUT#15,A,A$,B,C:IF A=
       0 THEN PRINT "CREATING
       {SPACE}ML FILE":GOTO190
AG 140 IF A<>63 THEN PRINT A$:
       CLOSE 15:END
CS 150 PRINT "FILE EXISTS. REP
       LACE IT? (Y/N)"
FM 160 GET X$:IFX$="" THEN160
MR 170 IF X$<>"Y" AND X$<>"Y"
       {SPACE}THEN CLOSE 15:EN
       D
DK 180 PRINT#15,"S0:"+F$:CLOSE
        2:GOTO120
GD 190 READ BYT:IF BYT<>256 TH
       EN PRINT#2,CHR$(BYT);:G
       OTO190
CX 200 CLOSE 2:CLOSE 15:PRINT
       {SPACE}"DONE"
QG 210 DATA 0,37,0,0,0,0,0,0,0
       ,0,162,196
MC 220 DATA 160,37,142,38,3,14
       0,39,3,169,38
KQ 230 DATA 141,169,9,169,203,
       141,177,9,169,0
JG 240 DATA 141,164,31,162,148
       ,160,38,142,110,23
EH 250 DATA 140,111,23,162,163
       ,160,38,142,137,24
EM 260 DATA 140,138,24,169,32,
       141,136,24,76,13
RJ 270 DATA 8,169,0,141,2,37,1
       41,3,37,173
PF 280 DATA 4,37,24,105,3,141,
       4,37,238,5
PP 290 DATA 37,173,5,37,201,66
       ,208,10,32,228
DX 300 DATA 255,201,13,208,249
       ,32,101,37,76,248
EH 310 DATA 37,169,23,141,24,2
       08,169,27,141,17
SG 320 DATA 208,169,151,141,0,
       221,169,0,141,0
EQ 330 DATA 37,96,169,148,141,
       0,221,169,59,141
EF 340 DATA 17,208,169,56,141,
       24,208,141,0,37
HH 350 DATA 169,224,141,166,37
       ,169,0,141,5,37
AC 360 DATA 141,165,37,141,2,3
       7,141,3,37,141
SE 370 DATA 4,37,170,138,157,0
       ,224,232,208,250
PM 380 DATA 238,166,37,173,166
       ,37,208,241,169,16
QP 390 DATA 157,0,204,157,0,20
       5,157,0,206,157
EA 400 DATA 0,207,232,208,241,
       96,72,141,1,37
SD 410 DATA 152,72,138,72,173,
       7,37,240,45,173
FR 420 DATA 0,37,208,3,32,122,
       37,173,1,37
GP 430 DATA 201,13,208,3,76,61
       ,37,201,32,208
GR 440 DATA 3,76,18,38,144,12,
       201,219,176,8
DK 450 DATA 201,193,176,18,201
       ,91,144,14,104,170
DM 460 DATA 104,168,104,96,104
       ,170,104,168,104,76
AX 470 DATA 202,241,32,38,38,2
       38,4,37,32,38
QA 480 DATA 38,206,4,37,169,4,
       24,109,2,37
PR 490 DATA 141,2,37,173,3,37,
       105,0,141,3
JQ 500 DATA 37,76,248,37,165,2
       54,72,165,255,72
FD 510 DATA 173,4,37,74,74,74,
       133,255,160,0
KS 520 DATA 132,254,74,102,254
       ,74,102,254,101,255
CD 530 DATA 133,255,173,4,37,4
       1,7,24,101,254
K8 540 DATA 133,254,165,255,10
       5,224,133,255,173,2
EX 550 DATA 37,41,248,24,101,2
       54,133,254,165,255
KC 560 DATA 109,3,37,133,255,1
       73,2,37,41,7
MS 570 DATA 170,169,0,56,106,2
       02,16,252,141,6
FX 580 DATA 37,74,13,6,37,74,1
       3,6,37,72
AB 590 DATA 160,0,166,1,169,52
       ,120,133,1,104
FH 600 DATA 17,254,145,254,134
       ,1,88,104,133,255
JD 610 DATA 104,133,254,96,72,
       224,3,208,5,169
KC 620 DATA 1,141,7,37,104,32,
       186,255,96,141
ED 630 DATA 29,13,72,169,0,141
       ,7,37,32,101
PK 640 DATA 37,104,96,256
```

Program 2: Unified File Maker

```
RJ 100 IFA=0THENINPUT"{CLR}NAM
       E OF SPEEDSCRIPT";SS$:I
       NPUT"NAME OF SPEEDVIEW"
       ;SV$
AE 120 IFA=0THENA=1:INPUT"NAME
        OF COMBINED FILE";NF$:
       PRINT"{DOWN}LOADING FIL
       ES"
GQ 130 IFA=1THENA=2:LOADSS$,8,
       1
SF 140 IFA=2THENA=3:LOADSV$,8,
       1
MQ 150 A$="9480":FORI=0TO3:POK
       E2054+I,ASC(MID$(A$,I+1
       ,1)):NEXT
QS 155 PRINT"{DOWN}WRITING COM
       BINED FILE":OPEN1,8,8,"
       0:"+NF$+",P,W"
JX 165 PRINT#1,CHR$(1);CHR$(8)
       ;
HS 170 FORI=2049TO9910:PRINT#1
       ,CHR$(PEEK(I));:NEXT:CL
       OSE1:END
```

Commodore 128 Machine Language

Part 4

Jim Butterfield, Associate Editor

Previous installments of this series of articles have explained some fundamentals of machine language programming on the Commodore 128. In this session, we'll look at ways that a program can get information from various parts of the 128's memory architecture.

Banks Or Configurations

Figure 1 shows the memory configuration called bank 15. As you can see, it's a varied assortment of memory elements: RAM, ROM, and I/O chip registers. The bank 15 configuration is usually the most comfortable setup for machine language programming.

Sometimes a program needs to get information from an area that's not visible in the current configuration. When this happens, the configuration must be switched to allow access to the desired data. The switch may be very brief indeed—just long enough to allow the data to be read or stored—or it may be a semipermanent reconfiguration.

Types Of Bank Switch

Data may be read from or written to any standard configuration (bank) by using one of a set of Kernal subroutines. The routine named INDFET ($FF74) gets a byte, INDSTA ($FF77) stores a byte, and INDCMP ($FF7A) compares a byte

Figure 1. Bank 15 Configuration

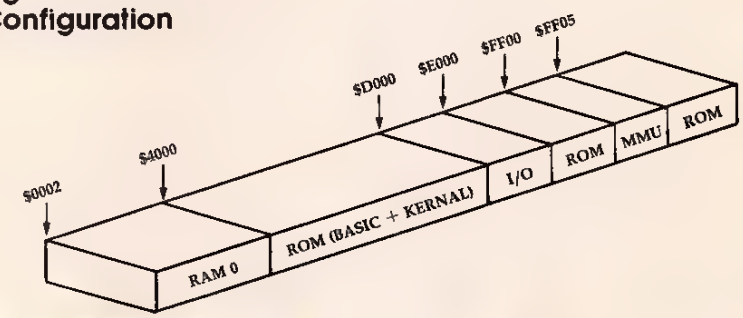


Figure 2. Bank 0 Configuration

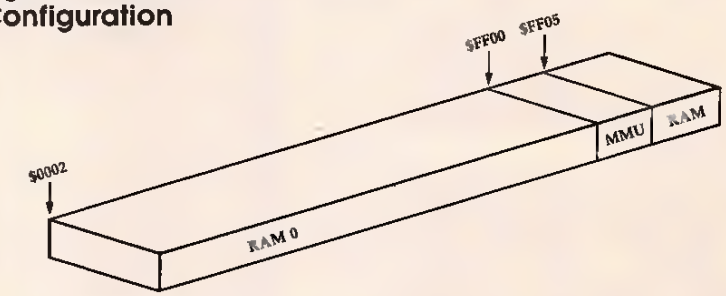
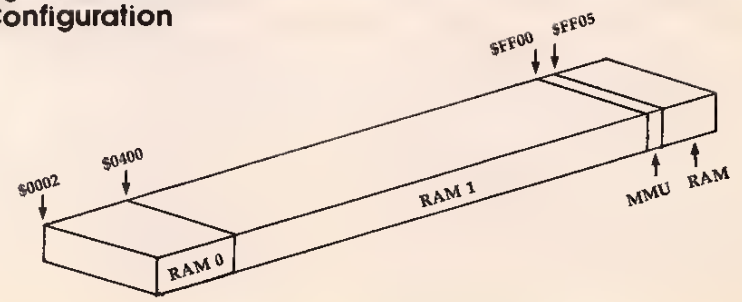


Figure 3. Bank 1 Configuration



(more on these later). First note that these three routines are a little slow (measured on the rapid scale of machine language operations). They switch in the appropriate configuration, do their business with one byte, then switch everything back. To read, compare, or store a hundred bytes, these routines would perform two hundred bank switches.

As an alternative, you can manipulate the configuration directly. The configuration can remain for as long as you need. However, you must be careful. If you switch out the Kernal ROM, you must take care not to try to use Kernal routines until it has been switched back in. The same goes for the I/O registers: You can't use them when they are not there (when the processor has no means to address them). Worst of all, a clumsy program could make itself vanish by switching out the bank in which it resides.

The Kernal Switches

For most purposes, only four standard configurations are necessary:

Bank 15. Very convenient for ML programming. It has RAM from block 0, BASIC and Kernal ROMs, and the I/O chip registers (Figure 1).

Bank 14. Very similar to bank 15, but this configuration contains the character generator ROM at locations $D000–$DFFF instead of the I/O chip registers.

Bank 0. Almost purely RAM from block 0. The exceptions are addresses $0000–$0001, which are the 8502 microprocessor's on-chip I/O port registers and addresses $FF00–$FF04, where MMU (memory management unit) chip registers are always seen, regardless of the bank configuration. Your machine language program will usually reside in this bank, and BASIC program text will also be stored here. As long as you don't try to do I/O or call Kernal routines, it's also a convenient bank for ML programming (Figure 2).

Bank 1. RAM from block 0 in addresses $0002–$0400. Above that, the bank consists of RAM from block 1 (except for the MMU chip registers at $FF00–$FF04). Use this configuration to read or change BASIC variables, arrays, and strings (Figure 3).

Your program may reside in one place, but may need access to information from an area that isn't visible in the current configuration. To do this, you may use one of the following Kernal routines:

INDFET	INDirect FETch	$FF74
INDSTA	INDirect STore	$FF77
INDCMP	INDirect CoMPare	$FF7A

Note that these routines are in Kernal ROM. If you call them, the Kernal must be visible, and that usually means that you're in bank 15. Before calling the routine, you must set up an indirect address somewhere in the zero page of memory to be a pointer to the address you wish to access. Then you must tell the routine where this indirect address is located, and set the processor's Y register with the offset from the address in the pointer to the one you actually wish to access. (Load Y with $00 if you wish to access the exact address in the pointer.)

Here's an example. Suppose you wish to read the contents of address $2468 within bank 1 using the Kernal INDFET routine. The first job is to pick an indirect address somewhere in page zero to serve as a pointer. Locations $FB–$FC are free, so the desired address can go there (LDA #$68: STA $FB: LDA #$24: STA $FC). In this case we set Y to zero (LDY #$00). The bank number goes into the X register (LDX #$01 for bank 1). Finally, we must tell the INDFET routine where to find the indirect address pointer we have set up. This is done by loading the accumulator (A register) with the pointer address:LDA #$FB. Now we can call INDFET with JSR $FF74. Upon return from the ROM routine, the accumulator will hold the value read from address $2468 in bank 1.

The procedure for using INDSTA or INDCMP to store or compare a value in another bank configuration is similar, except that it takes a bit more work to indicate the direct address location. Suppose you want to store the value 7 into location $CDEF in bank 0. It could be done this way: Begin by storing the target address in $FB–$FC (LDA #$EF: STA $FB: LDA #$CD: STA $FC). Next, tell the system where the indirect address pointer is located by storing the pointer address directly in the INDSTA routine, at address $02B9 (LDA #$FB: STA $02B9). To use INDCMP comparison rather than INDSTA for a store, you should store the indirect pointer address in $02C8. Set up the Y index (LDY #$0) and put the bank number in X (LDA #$00 for bank 0). Now you can load the byte value to be stored into the accumulator (LDA #$07) and complete the store operation with JSR $FF77.

After having done the selected task, these ROM routines return you to the same configuration that was set up when the routine was called. By the way, if you're wondering if there is a proper bank for addresses such as $FA or $02B9, don't worry. Addresses below $0400 are always seen in block 0 RAM in normal operation.

If you're using the bank 15 configuration, a shortcut is available for storing data in bank 0. Remember that bank 0 and bank 15 see the same RAM (block 0) in all addresses below $4000. In the bank 15 configuration, reading the contents of a ROM address ($4000–$CFFF or $E000–$FFFF) always returns the value from the corresponding ROM location, but writing to the address actually causes the value to be stored in the corresponding location in the underlying block 0 RAM. Thus, when you are programming in bank 15 (or bank 14), it's not necessary to use INDSTA to place values in bank 0 unless you need access to a RAM address under the I/O block ($D000–$DFFF). For instance, the example above could have placed a value in location $CDEF of bank 0 simply using STA $CDEF. However, the INDFET and INDCMP routines are still required for reading or comparing bank 0 locations from the bank 15 configuration.

Example Program

Here's a program to illustrate these techniques. First, a word to explain what it does. INPUT# is a problem command in BASIC. It often works well and efficiently, but it misbehaves when it encounters certain characters in a file. The characters that cause the most trouble are the comma, the colon, and sometimes quotation marks. If any of these are

found in a file, INPUT# may not perform a clean input. One more thing: On the 128, INPUT# causes trouble if it brings in more than 160 characters before it finds a carriage return (character 13).

Let's create a problem file that INPUT# won't be able to handle. Enter this BASIC program:

```
100 DOPEN#1,"WEIRD FILE",W
110 IF DS<>0 THEN PRINT"DISK E
    RROR:";DS$:DCLOSE#1:STOP
120 PRINT#1,"THIS IS ";CHR$(34
    );"WEIRD";CHR$(34)
130 PRINT#1,"DOCTOR CHIP, PHD.
    "
140 PRINT#1,"PRICE: FREE"
150 FOR J=1 TO 25
160 PRINT#1,"BORING, ";
170 NEXT J
180 PRINT#1,"AND DULL."
190 DCLOSE#1
```

Be sure to put a semicolon at the end of line 160. Do not put a space between the number signs (#) and the preceding characters or the program won't work. When you run the program, it writes a sequential file named WEIRD FILE to disk.

The file contains valid data, but INPUT# will have problems with it. The first line contains quotation marks, the second has a comma, the third has a colon, and the last line is longer than INPUT# can handle. To see how INPUT# fails, type NEW and enter this program:

```
100 DOPEN#1,"WEIRD FILE"
110 IF DS<>0 THEN PRINT"DISK E
    RROR:";DS$:DCLOSE#1:STOP
120 INPUT#1,A$
130 PRINT A$
140 IF ST=0 THEN 120
150 DCLOSE#1
```

When you run the program, the first line comes in without problems; however, it would have created trouble if the quotation marks had begun the line. The second and third lines are missing everything after the comma and colon, and the fourth line of data doesn't come in at all (it causes an error).

String Thing

The "String Thing" program provides a substitute for the flawed INPUT# statement. It reads from a file and puts the data directly into a string. It isn't bothered by commas, colons, or quotation marks—they are just ASCII characters like any others. A carriage return or end-of-file marker terminates the input. If the string's too long to fit the space provided, String Thing brings in as much as it can.

The toughest part is interfacing with BASIC. How can a machine language routine pass a string to a BASIC program? The answer is, "only with great care." Strings can be difficult to manipulate. Like numeric variables, each string variable has an entry in the variable table at the bottom of free memory in block 1. However, the table entry for a string variable doesn't contain the actual characters that make up the string. Rather, the characters are stored in an area at the top of free memory in block 1, known as the string pool. The table entry contains a three-byte *descriptor* for the variable. The first byte of the descriptor holds the length of the string. The remaining two bytes contain the address (in standard low-byte/high-byte format) of the location within the string pool where the characters for the string begin.

To simplify the task of passing strings, we'll create the string in BASIC, change its contents from machine language, then let BASIC use the changed results. We'll avoid moving the string or trying to change its length—both rather complicated operations. The string can be created with a BASIC statement something like A$="XXXXX". We'll also use BASIC to open the file, since that will help keep the machine language routine short and simple. Then we call the ML program to read from that file and store the results in A$. When a line of input from the file has been read, we return to BASIC and use A$, which now contains the input from the file.

Bank Considerations

Our program will be located in block 0 RAM, and the string we want will be in block 1. To store values in the string, we need to cross banks with INDSTA. But first we must find where the string is located. That information is stored in the string descriptor in the variable table, also in block 1, so the block 0 ML program must retrieve it from there using INDFET.

To make the string easy to find, we'll make sure it's the very first variable defined in the BASIC program. This eliminates the need to search for it by name.

Here we go. Since we know the string is the very first variable, we can use the system's start-of-variables pointer in locations $2F–$30 as an indirect address to the descriptor in bank 1. We don't need the variable name, contained in the first two bytes of the table entry, so we start our index Y at a value of 2:

```
B00 LDY #$02
```

To call INDFET correctly, we need to set the accumulator to the indirect address ($2F in this case) and set the X register to the bank number (in this case, 1 for bank 1).

```
B02  LDA  #$2F
B04  LDX  #$01
B06  JSR  $FF74
```

The JSR $FF74 calls the INDFET routine. When that routine returns, the accumulator contains one byte of the string descriptor. We save that byte in a zero-page area (starting at location $FB) and go back for more.

```
B09  STA  $00F9,Y
B0C  INY
B0D  CPY  #$05
B0F  BNE  $0B02
```

Since Y starts at 2 and goes up to 4, we'll store data in locations $FB–$FD. Location $FB contains the length of the string and $FC–$FD contain its location. These three bytes—length and location—constitute the string's descriptor.

Now we know where the target string is located in bank 1; that's where we'll put the input from the file. Let's connect to the file:

```
B11  LDX  #$01
B13  JSR  $FFC6
```

The ROM routine at $FFC6 is CHKIN, which selects logical file 1 for input. (The BASIC program which calls this routine must open logical file 1 to the desired disk file before the routine is called.)

```
B16 LDY #$00
```

The Y register will be used as an index into the string, so we initialize it for the first character position. Now let's get some characters:

```
B18  JSR  $FFCF
B1B  CMP  #$0D
B1D  BEQ  $0B32
```

The BASIN routine ($FFCF) brings in a character. If it's a carriage return, we've reached the end of the current string, so we branch

ahead to the exit. Otherwise, our task is to store the character in block 1 using the INDSTA routine. INDSTA requires the address of an indirect pointer—in this case the address of our string at $FC–$FD—in location $02B9.

```
B1F   LDX  #$FC
B21   STX  $02B9
```

Now we must put the bank number into the X register. By the way, upon return from INDSTA the accumulator still contains the character from the file that we are going to put away.

```
B24   LDX  #$01
B26   JSR  $FF77
```

The character is stored in the string using INDSTA ($FF77). Now we can move the pointer along to the next position within the string, so that the next character goes in the proper place:

```
B29   INY
B2A   CPY  $FB
B2C   BEQ  $B32
```

We've also tested to see if the string is full—if so, we'll skip ahead to the exit. One last test and the main job is done. We want to stop if we have reached the end of file or if an error occurs while the disk is being read. We check this by testing the serial status byte located at $90. (The value here is the one returned when you use the reserved variable ST in BASIC programming.) If it's zero, we're not at end of file.

```
B2E   LDA  $90
B30   BEQ  $0B18
```

If we're at the end of a string or the end of the file, we don't branch back. Instead, we use the Kernal CLRCH routine ($FFCC) to disconnect the input file. Also, we transfer the number of characters read into the string into the accumulator.

```
B32   JSR  $FFCC
B35   TYA
B36   RTS
```

There it is: a useful program that demonstrates loading and storing data across banks. Let's gather it together as a BASIC program.

String Thing Demo

```
90 REM * TARGET VARIABLE MUST
     {SPACE}BE FIRST ONE ASSI
     GNED, AND MUST BE INITIA
     LIZED WITH A DUMMY STRIN
     G OF MAXIMUM POSSIBLE LE
     NGTH (255 CHARACTERS)
100 A$="ABCDEFGHIJKLMNOPQ"
110 A$=A$+A$+A$+A$+A$
120 A$=A$+A$+A$
190 REM * FOLLOWING LINES POKE
      THE STRING THING CODE I
     NTO THE CASSETTE BUFFER
200 FOR J=2816 TO 2870:READ X:
     POKE J,X:T=T+X:NEXT J
210 IF T<>7688 THEN PRINT"ERRO
     R IN DATA STATEMENTS":ST
     OP
220 DATA 160,2,169,47,162,1,32
     ,116,255,153
230 DATA 249,0,200,192,5,208,2
     41,162,1,32
240 DATA 198,255,160,0,32,207,
     255,201,13,240
250 DATA 19,162,252,142,185,2,
     162,1,32,119
260 DATA 255,200,196,251,240,4
     ,165,144,240,230
270 DATA 32,204,255,152,96
390 REM * READ THE DEMONSTR
    ATION FILE USING STRING
     THING ROUTINE
400 DOPEN#1,"WEIRD FILE":IF DS
     <>0 THEN PRINT"DISK ERRO
     R: ";DS$:DCLOSE#1:STOP
410 SYS 2816:REM * EQUIVALENT
     {SPACE}TO INPUT#1,A$
420 RREG L
430 PRINT LEFT$(A$,L)
440 IF ST=0 THEN 410
450 DCLOSE#1
```

We take care to make A$ the first variable and make it a string of the maximum allowable length (255 characters). Lines 200–270 read the machine language routine from DATA statements and POKE it into memory. The program also demonstrates some BASIC 7.0 statements. DOPEN opens a disk file and DCLOSE closes it. DS and DS$ check disk status. RREG retrieves the values held in the microprocessor registers upon return from the SYS. In line 420, it is used to transfer the accumulator contents into the variable L.

Note the use of LEFT$ in line 430. If you used just PRINT A$ you'd get garbage characters following the input string. The String Thing routine takes a shortcut when writing characters into the string—it doesn't try to change the length of the string, since that's rather complicated in machine language. If you want to manipulate the string read from disk, use a statement like B$=LEFT$(A$,L) to create a string of the true length. (Don't change A$ in BASIC; you want A$ to remain 255 characters long so that you can read large strings from disk.)

We've still seen only part of the story. There are more techniques that you may need to work within the 128's unique and powerful architecture. Stay tuned. ©

64 RAM EX-PAN-DER

Alton C. Williams

Would you like to expand your Commodore 64's memory without hardware add-ons? This short utility program opens an extra 16K of memory for storing machine language programs which can be executed with a normal SYS from BASIC. It doesn't really change your 64—the memory has always been there, hidden under the computer's ROM chips. But the program does make this memory easily accessible from BASIC, almost as if you'd gotten a free 16K memory upgrade.

The Commodore 64 has more memory than meets the eye. However, most machine language programs use the 4K section of RAM located at 49152–53247 ($C000–$CFFF) or the small 191 bytes of cassette buffer space at 828–1019 ($033C–$03FB). That's not enough room for very long programs. And

since many 64 programs use these same areas, it's hard to find a place for a new machine language program without consuming some of BASIC RAM, which in turn leaves less room for a BASIC program and variables.

Fortunately, there's another solution. The 64 has a full 16K (16,384 bytes) of RAM underlying the BASIC and Kernal ROM chip addresses. The BASIC language interpreter is located in the 8K section from 40960–49151 ($A000–$BFFF), and the Kernal operating system is located in the 8K section from 57344–65535 ($E000–$FFFF).

To use this extra memory from BASIC, however, is not easy—one reason why it's often called hidden RAM. If you SYS to an address in this area from BASIC, the computer executes the instructions recorded in the ROM addresses, ignoring the contents of the hidden RAM. For instance, SYS 59626 calls the Kernal ROM routine that scrolls the screen up one line. SYS 58726 calls the ROM routine to home the cursor, and so on.

"64 RAM Expander" opens up new programming space by allowing you to SYS to a machine language program stored in underlying RAM. It doesn't really expand your 64's memory (the RAM has been there all the time), but the effect is the same as if you suddenly gained 16K of extra memory space.

Expand Your RAM

Type in and save a copy of 64 RAM Expander (Program 1). To use the program, simply load and run it. Now you can install any machine language program designed to reside in the hidden RAM. Use the statement SYS 920 to tell the computer that subsequent SYS statements will use the hidden RAM area. To return SYS to normal, use the statement SYS 931. These two commands allow you to switch the hidden RAM in and out at will.

When you SYS to hidden RAM, 64 RAM Expander switches out the ROM overlying the area where the program is located. If your program doesn't call BASIC or Kernal routines, that poses no problems. But BASIC ROM routines are not available when you SYS to a program located under BASIC (however, you may still call Kernal ROM routines). If your program is located under the Kernal ROM, neither BASIC nor Kernal routines are available, since switching out the Kernal ROM switches out BASIC as well.

This program occupies the cassette buffer area from memory locations 920–1018 ($0398–$03FA). Do not use those locations when 64 RAM Expander is installed.

A Short Demonstration

Program 2 is a short BASIC loader which demonstrates 64 RAM Expander. Load and run 64 RAM Expander; then load and run Program 2. It POKEs a short machine language routine into the RAM underlying BASIC ROM, activates 64 RAM Expander with SYS 920, then activates the hidden ML program with a SYS to location 41000 (SA in line 90). The program cycles the screen border colors until you press a key.

If you're not familiar with bank switching on the 64, you may well wonder how one writes a program designed to live in the RAM under ROM. Most machine language monitors see only ROM at those addresses, since the monitor itself typically needs ROM routines to function. One way is to write fully relocatable code, which executes the same way no matter where it loads into memory. The longer the program, however, the more difficult it becomes to preserve full relocatability. Another way is to write the program in a more convenient area, then adjust all the absolute addresses by hand. Again, that's a tedious business for all but the simplest programs. The best solution is to use a good machine language assembler which allows you to assemble object code to a disk file rather than to memory. Once the object file has been created, you can load it with ,8,1. Like POKEs from BASIC, a relocating load stores data in underlying RAM rather than ROM.

For instructions on entering these listings, please refer to "COMPUTE!'s Guide to Typing In Programs" in this issue of COMPUTE!

Program 1: 64 RAM Expander

```
KE 10 PRINT"{CLR}":T=0:FOR I=9
      20 TO 1018:READX:T=T+X:P
      OKEI,X:NEXT
FC 20 IF T<>9573 THEN PRINT"ER
      ROR IN DATA STATEMENTS!!
      ":END
FM 30 PRINT"EASY 16K IS NOW RE
      ADY FOR USE!":END
ES 31 DATA 169,174,141,8,3,169
      ,3,141,9,3,96,169,228,14
      1,8,3,169
PG 32 DATA 167,141,9,3,96,32,1
      15,0,8,201,158,240,4,40,
      76,231,167
EM 33 DATA 40,32,115,0,32,138,
      173,32,247,183,24,165,21
      ,105,32,144,8
QX 34 DATA 120,169,48,133,1,76
      ,227,3,165,21,105,64,176
      ,10,165,21,105
GD 35 DATA 96,144,4,169,54,133
      ,1,169,243,56,233,1,170,
      169,3,233,0
PD 36 DATA 72,138,72,108,20,0,
      169,55,133,1,88,76,174,1
      67
```

Program 2: RAM Expansion Demo

```
CS 10 REM POKE PROGRAM INTO RA
      M UNDER BASIC ROM
GB 20 ADR=41000:SA=ADR:CHK=0
EF 30 READ BYTE:IF BYTE<>256 T
      HEN POKE ADR,BYTE:ADR=AD
      R+1:CHK=CHK+BYTE:GOTO 30
RD 40 IF CHK<>1577 THEN PRINT
      {SPACE}"ERROR IN DATA ST
      ATEMENTS":END
QE 50 SYS 920:REM TURN ON RAM
      {SPACE}EXPANDER
BG 60 PRINT:PRINT
DX 70 PRINT "NOW RUNNING ML PR
      OGRAM UNDER BASIC ROM."
ED 80 PRINT "PRESS ANY KEY TO
      {SPACE}QUIT."
EA 90 SYS SA:REM START OUR PRO
      GRAM
CD 100 DATA 238,32,208,32,228,
       255,240
DS 110 DATA 248,96,256
```


Attention Programmers

COMPUTE! magazine is currently looking for quality articles on Commodore, Atari, Apple, and IBM computers (including the Commodore Amiga and Atari ST). If you have an interesting home application, educational program, programming utility, or game, submit it to COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. Or write for a copy of our "Writer's Guidelines."

Computers and Society

Dovid D Thornburg, Associate Editor

Whatever Happened To Logo?

Five years ago I predicted the demise of BASIC and its eventual displacement by Logo as a programming language for neophytes. In the intervening years I have spoken in defense of Logo to thousands of school teachers interested in educational computing, written numerous articles about Logo (including a monthly column that appeared in COMPUTE!), written seven books on the topic, and used Logo as my own programming language of choice and as a language for a successful course for graduate students in design.

As I look back on the past five years, I see that my own vision was clouded by my enthusiasm and that what I saw was largely a dream, not an accurate reflection of the world of educational computing. BASIC, for all its warts (and it has plenty), is as firmly entrenched as the QWERTY keyboard. Far from being dead, it is as popular as ever. Its original developers have even breathed respectability into BASIC by providing it with features found in other programming languages.

The Vision

Logo burst into public view with a one-two punch that seemed to gather momentum among computer-using educators who saw the computer as a tool for developing a new curriculum in problem solving. Based on the notion that children learn best by discovery, Logo was seen by its creator, Seymour Papert, as a language that children could use to make discoveries about mathematics. His views, developed over years of study and research at MIT and elsewhere, were published in the book *Mindstorms—Children, Computers, and Powerful Ideas* (Basic Books, 1980). Shortly after his book appeared, versions of Logo were developed for just about every computer to come along.

Logo was presented as more than a programming language; it was inextricably linked to an educational philosophy—a philosophy that placed the child in an active role in the learning process. However wonderful Papert's ideas may be, many of them run counter to education as it is practiced in this country. Educational reform is a lengthy process and, while the philosophy associated with Logo points in a direction that appeals to some of us, it apparently lacks the "critical mass" of a Sputnik needed to shift our educational system.

LISP For Mortals

Logo is based on the artificial intelligence programming language, LISP. Like LISP, Logo supports symbolic (as opposed to purely numerical) computation. It was Logo's ability to support the creation of programs that touched the reaches of modern computer science—not its philosophical underpinnings—that attracted me to it in the first place.

But, because Logo was treated by many as a geometry language for kids that would let them create pretty pictures, the remainder of this language lay hidden from view. Of the authors whose books are still in print, Brian Harvey and I are among the few who have explored the spectrum of Logo programming in any depth.

A problem encountered by many who try to use Logo as a programming language is that it supports powerful computational concepts (such as recursion) that are hard for neophytes to grasp. Most beginning Logo programmers quickly master the descriptive graphics programming aspects of the language and then give up when they encounter the more difficult domain of Logo's symbolic computation. For example, Logo makes little distinction between programs and data. This allows Logo programs to be written whose output is other Logo programs, but this requires some skill to master. Most teachers lack the time needed to learn the nongraphic aspects of Logo, and this has helped perpetuate the myth that Logo is a picture-drawing language only to be used by young children.

Slow And Big

Even those who have mastered "the rest of Logo" have found the going rough. Most interpreted versions of this language are slow and big. This has two consequences for those who use Logo on 64K- or 128K-based computers. First, Logo programs run much slower than their BASIC counterparts. Second, users can't write very large programs. These two defects, however, are the result of Logo's implementations, not defects in the language itself.

A few years ago, those of us who saw Logo as more than a playground for young minds started a campaign to encourage the development of a Logo compiler. A compiler solves both the speed and size problems at once. It is interesting to note that none of the Logo language vendors within geographic proximity of Papert's MIT responded to this challenge. Instead, the first commercial Logo compiler for a microcomputer was developed by Expertelligence in Santa Barbara, California. Recently, Coral, an East Coast company, announced a compiler-based Logo.

While these are steps in the right direction, Logo deserves to be widely used. And it will die unless its base is broadened.

David Thornburg is a regular contributor to this magazine and is the designer of Calliope™, *a nonlinear idea processor for the Macintosh and Apple II series of computers. He can be reached in care of this magazine.*©

Computer Pop-up Books

My seven-year-old son Eric is a highly visual thinker, as evidenced by the intricate and elaborate drawings he makes of bridges, underground mines, space stations, buildings, and mazes. Eric is fascinated by books with detailed, complex pictures like *Noah's Ark* by Peter Spier, and *Cathedral* and *Pyramid* by David Macaulay. On the other hand, he struggles with books which have lots of words but whose pictures are simple and spare. And, unfortunately, in school the tendency is to wean Eric from pictures and to force him to use words instead.

Eric may not love books and words, but he does love stories, and he has a rich imagination. He likes to do his storytelling visually by dressing up and acting out parts and by creating concoctions and inventions out of things like string, rubber bands, play dough, balloons, food coloring, and water. This interest in storytelling through manipulation of real objects carries through to Eric's love of Lego building blocks and robot GoBots and Transformers. Eric will spend hours designing a Lego spaceship or transforming his little robots, but he won't spend ten minutes with a book. For Eric, the environment of the book is too frozen, abstract, and visually impoverished, compared to the rich, dynamic, visual environment of his favorite toys.

Eric is not particularly interested in books in general, but he loves "pop-up" books where the emphasis is less on words and more on manipulating the characters and objects in the stories. I recently discovered a new series of pop-up "books" for Apple computers that I think Eric will love. The books are part of the Explore-a-Story series being published by D.C. Heath, the school textbook company. There are eight different titles in the series, including "The Bald-Headed Chicken," "The Lima Bean Dream," and "What Makes a Dinosaur Sore?"

Transformable Software Books

The books themselves are nice enough; they are similar to other children's picture books. But it is the software "books" that are unique and exciting. Children can page through the software book on the computer display screen just as they would page through the picture book.

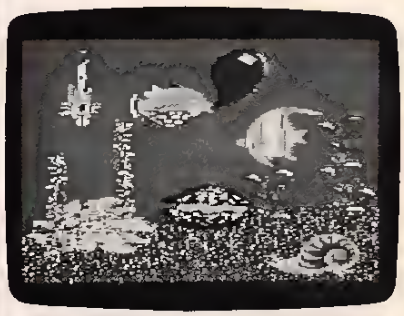
Then the real fun starts.

Using a mouse, joystick, or keyboard, children can transform the original story into something completely new. They can move any character or object in the story, or change the entire background. They can add dozens of new characters and objects to each illustration. They can add their own text to each story page, erase the old text, or create entirely new text. The story can then be saved to disk or printed out as text or as a coloring book.

There are several features of Explore-a-Story books that appeal to me and which I think will appeal to Eric. First, unlike standard printed books, the Explore-a-Stories are not immutable. They are like sand in a sandbox—"story starters" which give children a micro-world in which to concoct stories of their own.

Second, Explore-a-Stories are like good pop-up books because they combine three great elements which appeal to children: mystery, surprise, and animation. Built into the stories are all sorts of surprise characters and character actions. Whenever you set a character down, it "comes to life": rabbits hop, frogs bounce, eagles soar, lima beans dance and flop. Mothers turn flips. Fathers somersault.

Third, Explore-a-Stories are



like transformers because they let children manipulate the stories and transform them into something new and personally meaningful to each child.

"Create your own story" software is hardly new, but Explore-a-Stories have eliminated many of the defects in earlier programs and elevated the genre to a new level. And children like Eric might be coaxed away from a purely visual orientation to the world. This software gives them the ability to manipulate words almost as easily as pictures.

Each Explore-a-Story package costs $66 and comes with a double-sided disk, a backup disk, a teacher's manual, and five copies of the story. The disk runs on an Apple IIc or IIe with 128K. For more information, write D.C. Heath at 125 Spring Street, Lexington, MA 02173. ©

BASIC Slide Show For *NEOchrome* And *DEGAS*

Nearly every ST owner has used *NEOchrome*, the graphics program supplied with the computer, or *DEGAS*, the excellent drawing program written by Tom Hudson. Both programs allow you to create stunning graphics, but how can you incorporate such pictures in a BASIC program of your own? This month's program demonstrates one way to display *NEOchrome* and *DEGAS* pictures in any screen resolution, on color or monochrome 520ST or 1040ST systems. It adjusts automatically for the differences between *DEGAS* and *NEOchrome* pictures. However, you must set the correct screen resolution with Set Preferences *before* you run the slide show. (No harm is done if you display a picture in the wrong resolution, but the picture will be jumbled because the screen's bitplanes don't match up correctly.)

The program begins by asking for the filename of the picture you want to display. Enter the full drive-path and filename, including the extension. For instance, to display the *NEOchrome* file MYPIC.NEO located on the disk in drive A:, type the filename A:\MYPIC.NEO and press RETURN. To display a *DEGAS* file named MYPIC.PI2 from the subdirectory BASIC in drive B:, use B:\BASIC\MYPIC.PI2. Don't confuse the backslash (\) character with a normal slash (/) when typing filenames. The backslash indicates a subdirectory and is not interchangeable with a slash. After you've entered the filename, the program displays the picture and waits for you to press either mouse button. When you press the button, the screen clears, the original palette colors are restored, and you're invited to enter another filename. To exit, press RETURN at the prompt.

Behind The Scenes

Since column space is limited, this program includes only the bare essentials needed to get a filename and display a picture. If you want to transport these techniques to a program of your own, you'll probably want to refine the input routine and perform some checks for disk errors. Here's a nutshell description of how the program works. Lines 150–170 save the original palette colors in the array SAV%. Lines 180–190 call a VDI routine that hides the mouse pointer (so it won't spoil the picture). Lines 200–300 get the filename, adjust for the file type, and set the color palette for the new picture. The routine called in line 310 clears the entire screen surface with a VDI system routine. Lines 320–330 BLOAD the file into screen memory, and line 340 calls a routine that waits for a button to be pressed. Line 350 restores the previous palette so you can see what you're typing. Line 360 clears the last picture from the screen and goes back for another filename.

When you exit the program, lines 440–460 make the mouse pointer visible again. Notice that BASIC's menu titles don't reappear, although the menus still work as usual. ST BASIC is intelligent enough to redraw its windows when needed—unless you're rash enough to close all the windows at once—but it never refreshes the menu bar. The assumption seems to be that nobody would ever want to display full-screen graphics from

BASIC.

Handling Picture Files

Regardless of screen resolution, *NEOchrome* and *DEGAS* files always contain 32,000 bytes of actual screen data preceded by a short header. The header records the picture's resolution and color palette; it's 34 bytes long for *DEGAS* and 128 bytes long for *NEOchrome*. The palette data occupies 32 bytes. *NEOchrome* files also contain extra data for color cycling (this program doesn't do color cycling; it uses the palette that was in effect when you saved the picture).

To reconstruct a picture, the slide-show program reads the palette portion of the file into the string COL$, then directs the computer to use the bytes in COL$ as the new palette. Then it BLOADs the file into the ST's screen memory, using an offset to prevent the header portion of the file from going into the screen.

Location &H44E is a pointer that tells you where screen memory begins. Location &H45A, which ordinarily contains a zero, is a flag that lets you switch to a new palette. The ST scans this location as a background task during every VBI (vertical blank interrupt) interval. When you POKE a nonzero value into &H45A, the computer uses that value as the address of the new color palette. The program discovers the current palette by PEEKing the video display registers at 16745024. If the new version of ST BASIC includes ASK RGB and RGB (see last month's column) you should be able to read and change the palette with BASIC commands instead of fiddling with hardware registers.

System Variables

Locations &H44E and &H45A are "official" system variables that Atari has promised not to change in future system updates. Another interesting variable is location &H45E, a screen pointer flag that's scanned during the VBI like the palette flag. When you put a nonzero value there, the ST uses the value as the new address for screen memory, making it possible to page-flip between alternate screens.

If you incorporate these methods in a program of your own, be sure to use double-precision variables when dealing with system addresses. The DEFDBL A statement in this program defines all variables starting with A as double-precision, which in turn causes BASIC to use longword (four-byte) values when you PEEK or POKE with those variables. POKEing a byte-length or word-length (two-byte) value into a place like &H45A usually causes a crash known as a *bus error* when the processor tries to address a nonexistent memory location.

BASIC Slide Show

```
100   rem Display Degas/Neochro
      me pice.
110   rem Set reeolution BEFORE
       you run.
120   fullw 2:clearw 2
130   col$=string$(32,32)
140   defdbl a:dim sav%(15)
150   peave=16745024:k=0
160   for j=0 to 15
170   eav%(j)=peek(psave+k):k=k
      +2:next
180   poke contrl,123:poke cont
      rl+2,0
190   poke contrl+6,0:vdisys(0)

200   input "Enter filename";pi
      cname$
210   if len(picname$)=0 then 4
      40
220   flag$=left$(right$(picnam
      e$,3),1)
230   offset=128:junk=4:rem Neo
      chrome file
240   if flag$="N" or flag$="n"
       then 260
250   offeet=34:junk=2:rem Dega
      e file
260   cloee 1:open "I",#1,picna
      me$
270   x$=input$(junk,1)
280   col$=input$(32,1)
290   cloee 1:anu=varptr(col$)
300   apal=&H45A:poke apal,anu
310   goeub 370
320   ascr=&H44e:aa=peek(aecr)
330   bload picname$,aa-offeet
340   goeub 400
350   poke apal,varptr(sav%(0))

360   goeub 370:goto 200
370   poke contrl,3:poke contrl
      +2,0
380   poke contrl+6,0:vdieye(0)

390   return
400   poke contrl,124:poke cont
      rl+2,0
410   poke contrl+6,0:vdieye(0)

420   if peek(intout)=0 then 40
      0
430   return
440   poke contrl,122:poke cont
      rl+2,0
450   poke contrl+6,1:poke inti
      n,0
460   vdieye(0)                  ©
```

The Beginners Page

C. Regena

More About PRINTing

We started exploring the PRINT command last month. Let's now move on to look at ways to format text. Some of the commands we'll discuss are not identical on all versions of BASIC, so you'll need to experiment to see if they work on your computer, and, if so, what parameters (numbers and limits) are allowed. Try them out; it won't hurt the machine if it doesn't recognize a command. Your computer will just reply that you've made an error.

WIDTH is a command in some versions of BASIC that controls how many characters can be printed on a line across the screen. On some computers (such as an IBM PCjr), this command also determines the size of the characters or the resolution of the screen. For example, WIDTH 40 is a 40-character line with larger letters and medium resolution, and WIDTH 80 is an 80-character line with smaller letters. On the IBM PCjr, WIDTH 20 is a 20-character line in the low-resolution screen. Note that on the PCjr, changing the WIDTH also clears the screen.

On other computers (such as the Amiga and Atari ST), WIDTH *n* specifies *n* number of characters in the printed line, where *n* can be any number you wish to use to control margins. The size of the letters does not change. On computers with windows, it's possible to print beyond the visible portion of the window, so WIDTH is handy to keep the printing within the window. Here's an example using the WIDTH command:

```
10 A$="1234567890"
20 WIDTH 18
30 PRINT A$+A$+A$+A$
40 END
```

Specifying Location

Many versions of BASIC include commands for specifying where printing will be positioned on the screen. In BASIC for the IBM and for the Amiga, use LOCATE *row,column* to position the cursor, followed by PRINT to start printing:

```
80 LOCATE 5,10:PRINT "TITLE"
```

In Atari ST BASIC, use GOTOXY *column,row* to position the cursor, and then PRINT. Notice that this computer specifies the column number first, then the row number, and the upper left corner of the output window is 0,0. Also, the position of the printing will be slightly different than if you PRINT blank lines and then TAB over to a certain column:

```
80 GOTOXY 10,5:PRINT "TITLE"
```

Commodore BASIC has no special statements for positioning the cursor, but you can use cursor control characters within quotes to move up, down, left, and right. You can also use the TAB function, such as:

```
80 PRINT TAB(168);"HELLO"
```

The maximum number of character positions you can move with TAB is 255.

Create A Template

PRINT USING can be a real timesaver in specialized situations, but not all versions of BASIC offer it. The syntax varies slightly with brands of computers, so refer to your manual and experiment a little to see how this command works.

The main purpose of PRINT USING is to format your output—line up numbers or strings or perhaps print money amounts. If you print large numbers, you can use PRINT USING to place commas every third column for place values. You can print plus or minus signs for positive or negative numbers. You can print leading asterisks. You can use this command to round off numbers or to print to a certain number of decimal places even if there are trailing zeros. Here are some examples:

```
10 A=123.4567
20 B=64
30 C=.3
40 D=8.25031
50 PRINT USING "###";A
60 PRINT USING "###";B
70 PRINT USING "$$###.##";A
80 PRINT USING "$$###.##";B
90 PRINT USING "$$###.##";C
100 PRINT USING "###-";D
110 PRINT USING "###.# A ";A,B,C,D
120 PRINT USING "**###.##";C
130 END
```

You can also print strings with PRINT USING. The specifications vary with the brand of computer, so check your manual. Usually the exclamation point will print the first letter of a string, and backslashes or spaces between backslashes print certain numbers of characters in a string. The Atari ST allows characters (such as dots or numbers) between the backslashes to help you count how many characters can be printed. Here are some examples with strings:

```
10 S$="RICHARD
20 PRINT USING "!";S$
30 PRINT USING "\ \";S$
40 PRINT USING "HIS NICKNAME IS
   \ \";S$
50 PRINT USING "HIS INITIAL IS !.";S$
```

Review the last several "Beginner's Page" columns about strings. Using string control features with PRINT statements gives you significant control over the output of your computer. PRINT USING is very handy in printing columns of numbers for reports. You can also print lists such as name and address lists with columns lined up. Use a combination of TAB, SPC, and PRINT USING to get your reports to look precisely the way you want them to look.

If your computer has color, be sure to use color in printing on the screen to highlight certain words or to add variety to the output. The color statements vary with the computer. The following are a few examples:

```
10 REM ATARI ST
20 COLOR 1:PRINT "NORMAL"
```

```
10 REM ATARI ST
20 COLOR 1:PRINT "NORMAL"
30 COLOR 2:PRINT "RED
40 COLOR 3:PRINT "GREEN"
50 COLOR 1
60 END

10 REM IBM
20 COLOR 4:PRINT "RED
30 COLOR 2,7:PRINT "GREEN ON WHITE"
40 COLOR 0,7:PRINT "BLACK ON WHITE"
50 COLOR 7,0:PRINT "RETURN TO WHITE ON BLACK"
60 END

10 REM AMIGA
20 COLOR 2,3:PRINT "BLACK ON ORANGE"
30 COLOR 3,2:PRINT "ORANGE ON BLACK"
40 COLOR 0,1:PRINT "HELLO"
50 COLOR 1,0:PRINT "BACK TO NORMAL"
60 END

10 REM COMMODORE 64 AND VIC-20
20 REM USE CTRL AND A NUMBER
30 PRINT "{RED} HELLO {PUR}BOB"
40 REM USE RVS ON FOR INVERSE COLORS
50 PRINT "{WHT}{RVS}TRY THIS"
60 END
```

Commodore computers allow certain graphics symbols in PRINT statements to draw with built-in characters. You can use either the graphics key or print CHR$(*n*) where *n* is a character number for a certain graphics character.

With all these options available for the PRINT command, even the beginning BASIC programmer can create elaborate computer effects by "just" printing.©

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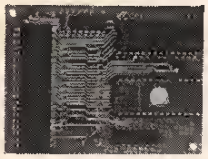

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INSIGHT: Atari

Bill Wilkinson

Your Roving Reporter

I attended (and exhibited at) the Los Angeles Atari Computer Faire on August 15 and 16, and I would like to share a few things I saw and a few thoughts I had. The most significant part of this Faire was probably Atari's presence. As far as I know, this was their first real participation in a user group–sponsored event, and they were there in force. Such Atari notables as Sam Tramiel, Sig Hartmann, John Feagans, Neil Harris, Mel Stevens, and Sandy Austin (and others who will undoubtedly embarrass me by asking me why I forgot them) all made an appearance.

Faster ST Graphics

Most important were the products being shown there for the first time. Atari's new blitter chip for the ST was being put through its paces. This chip takes over some of the graphics processing (such as moving sprites) that must be done in software on current ST machines. Depending on the type of processing, this chip should make graphics-oriented programs run from two to six (my estimate) times faster.

The 80-column adapter for the eight-bit machines was also on display, as was a new word processor for the ST: *Microsoft Write*. Although it is another nice, solid word processor, I did not see any really exciting features. But the very presence of Microsoft in the Atari world is expected by many to lend respectability to the ST machines.

The real battle for attention, though, was among the various purveyors of music software for the ST machines, particularly by the MIDI-oriented companies. Sounds ranged from exotically electronic to a guitar so realistic I thought it was a live accompaniment.

The Catalog (honest, that's the company's official name) people were showing off animated 3-D graphics, which wasn't too surprising, given the capabilities of Tom Hudson's *CAD 3-D* program. But then they added liquid crystal "shutter" glasses for *true* 3-D vision and a glimpse into some fascinating future possibilities. Liquid crystal glasses are not exactly a convenience store item (they usually go for hundreds or even thousands of dollars—mostly to the military), but you can expect to buy a pair sometime early next year for $150 or so, according to the exhibitors.

Significantly missing, though: the game companies. No Brøderbund, no Sierra On-Line, and so on. What a turnaround from the early days of the West Coast Computer Faire. Most attendees probably didn't complain, though, since there was a good deal of software for eight-bit and ST machines. There were literally hundreds of titles available in each category, even though the Faire organizers purposely limited the number of dealers at the Faire to four, and one of those sold no eight-bit software.

Finally, the show was put on by an association of user groups, and almost every member I talked to was pleased by the show and the turnout. Final figures were not in as I left, but John Tarpanian, president of both HACKS and ACENET, estimated the crowd for the two-day event at 3000 people. It seemed at least that big. Atari is encouraging at least two more such shows that I know of: one right here in San Jose in September, and one in Portland in October. There's another show in Virginia in November, though it's not as closely tied to Atari as these other three. I suggest attending one of these if you can.

Join Your Local User Group

This is the first of my answers to readers' inquiries, and it ties in neatly with the discussion above. Several people asked me where they could get (1) help with their hardware and/or software, (2) cheap public-domain programs, or (3) up-to-date news on events of the Atari world. My answer to all three? *Join a user group.*

I have pushed user groups in this column before, and I will probably do so again. At the Faire, for example, one person thanked me for getting him involved in a group—he had quickly gotten the help he needed. I asked him if he's now returning the favor to newer members. He is. He's the club's librarian.

There are over 300 active user groups in the U.S. now, so there's a good chance there is one near you. And if you join one, maybe you can help put on one of these Faires in the next year or two.

How do you find a user group? Ask a local dealer or look for announcements in newspapers. And user groups: Be sure to have a publicity chairperson who gets you mentioned in your hometown paper from time to time. If you are absolutely desperate, send me a *self-addressed, stamped envelope*, and I will give you the address of the closest group on my list. Send your request to P.O. Box 710352, San Jose, CA, 95171-0352. No guarantees of a good match, though.

Also, if you have a modem, you might like to know that I have an account on CompuServe. You can leave messages for me by using my account number: 73177,2714. I expect to be active on Delphi in the near future, too, but I don't have an account name for that service yet. Please understand that I cannot give long-winded answers online. It costs money, remember. But I don't mind comments, suggestions, or even quick questions. ©

IBM Personal Computing

Donald B. Trivette

Columns Revisited

One of the problems of writing about technology in general and computers in particular is how fast one product surpasses another. So this month I'm going to revisit three past columns and update you on some new and better products.

In June of 1985 I wrote about the Hewlett-Packard LaserJet printer which has since become an industry standard, although I take no credit for that. At the time I tested the machine, I asked the engineering types at Hewlett-Packard why they didn't make a combination office copier and computer printer since the two technologies seem so similar. They told me that the machines were really incompatible and the cost would double. Having been raised to respect police and engineers, I made no mention of the copier idea in my column. Nor did I dwell on the limitation of only being able to use eight different type styles—after all, that was in 1985.

Last month Xerox sent me its 4045 Laser printer to test. It has an arm under which one can slip an original and—guess what?—out comes a perfect Xerox copy. The copier feature adds a couple hundred dollars to the cost of the printer, but it's worth it. The 4045 permits the use of up to 22 fonts on a single page, and best of all, the command sequences to establish fonts, underlining, bolding, and other special effects are much simpler than those used on the HP. For example, I wrote that the sequence to begin bold printing on the LaserJet was *ec&10Oec(0Uec(s1p10v0 s1b5T;* the sequence for the 4045 is simply **b*.

Hewlett-Packard hasn't been idle in the intervening 18 months, and it's sure to have improved the LaserJet. But if you are looking for a high-quality laser printer, check out the Xerox 4045.

Second Thoughts

My February 1986 column extolled the virtues of compiled BASIC and the then new version of the IBM BASIC compiler. If I told you to buy it (I can't bare to look back), I apologize. After I wrote that column, Microsoft sent me a copy of its new *QuickBASIC Compiler*, which retails for $99. The IBM *BASIC Compiler* was priced at $495 in February of 1986—today it's $539.

I don't have the space to tell you why compiled BASIC is so much faster than the BASIC built into your PC (see the February column), but I do have the space to tell you that *QuickBASIC* is equal, even superior, to the IBM software. In all my tests, the Microsoft product compiled larger programs, produced smaller EXE modules, and did it in less time than the IBM product which costs five times more. *QuickBASIC* uses the same commands, files, and switches as the IBM compiler—and why not? Microsoft wrote the version sold under the IBM name.

If you're thinking about a BASIC compiler, don't think about IBM; just buy Microsoft's *QuickBASIC*. (By the time you read this, version 2.0 of *QuickBASIC* will be available.)

Online Thesaurus

In writing about a RAM-resident spelling checker and a thesaurus in April of 1986, I noted that both products use the Random House dictionary. "Wonder what happened to Webster's?" I joked. Simon & Schuster was quick to let me know that it markets Webster's *New World On-line Thesaurus* and Webster's *New World Spelling Checker*.

I'll never give up IBM's *Wordproof* for another spelling checker, but I'm open on thesauruses. I was fairly happy using Reference Software's *Reference Set*, until I tried Simon & Schuster's product. It sets a new standard for online thesauruses.

Like most RAM-resident software, Webster's is called to the screen by pressing a preselected key combination—on my PC it's Alt-T. The program then tries to match the word under the cursor with one in its dictionary; failing that, it strips the word of prefixes and suffixes and attempts to locate the root word in its dictionary. Type "readmitted" and the program displays 20 words similar to the root "admit" in a window superimposed on the screen. Now here's the amazing part. Select the synonym "declare" and the program tries to add prefixes and suffixes to compose three choices: redeclared, declared again, and declare. By paring down to a root word, the program is able to generate more than 120,000 synonyms.

Along the same line, the program changes articles to match the nouns they precede. Placing the cursor under "an automobile" and calling forth synonyms shows but one—"motor car." When you select that synonym by pressing the F10 key, Webster's not only replaces "automobile" with "motor car," but also changes *an* to *a*.

One feature I particularly appreciate shows parts of speech and separates synonyms by meaning. For example, "fire" displays 19 synonyms for the noun, 13 for the verb, and 4 for the modifier "fiery." In addition, any of those words may be looked up for even more synonyms by simply pressing a key.

Webster's *On-Line Thesaurus*, at $70 from Simon & Schuster, is a must for anyone who writes. ©

Apple PowerKey

The key-definition program (Program 1, p. 67) for this powerful keyboard utility from the September issue has an error as listed. Our lister program trimmed a RETURN statement from the end of the very long line 340. The easiest way to correct the problem is to add the following line:

```
345 RETURN
```

Program 1 has an additional problem for Apple II+ users. The II+ keyboard doesn't include the backslash key used to append a carriage return character to a key-definition string. Reader George Teachman notes that changing the value 92 to 47 in lines 420 and 590 will allow II+ owners to use the regular slash (/) for this function.

The article states that Program 2 creates a file named POWERKEY.BINARY. Actually, the program creates a file named OMNIKEY.BINARY (see line 130). Thus, the instructions for loading the program in the "Putting It All Together" section of the article (p. 66) are incorrect. You can either change the name in line 130 of Program 2 to match the text, or change the name in the text to match the one currently used in the program.

Atari 130XE Automated RAM Disk

There is an error in line 360 of this program from the September issue (p. 68). The statement GOTO 460 in that line should be GOTO 470.

Amiga Tightrope

This Amiga game from the August issue (p. 47) suffers from the same problem as the "Hex War" game in the July issue: the use of lowercase l as a variable name. Unfortunately, on our listing printer the characters for l and 1 are identical, making it nearly impossible to tell where to type 1 and where to type l. In the "Tightrope" lines labeled 4, 5, and 6, the variables used are l1, l2, and l3, respectively. Variable l1 is also used in the line labeled 810. In the left column on page 49, you'll find statements that should read DIM l1%(L), DIM l2%(L), and DIM l3%(L), as well as l1%(I)=, l2%(I)=, and l3%(I)=. In the future, we'll do our best to eliminate the use of lowercase l as a variable name in Amiga programs.

On page 118 of the July issue of COMPUTE!, the price of the teacher's guide for Brøderbund's *Science Toolkit* was incorrectly listed as $20. Actual cost is $30.

COMPUTE!'s Guide To Typing In Programs

Computers are precise—type the program *exactly* as listed, including necessary punctuation and symbols, except for special characters noted below. We have provided a special listing convention as well as a program to check your typing—"The Automatic Proofreader."

Programs for the IBM, TI-99/4A, and Atari ST models should be typed exactly as listed; no special characters are used. Programs for Commodore, Apple, and Atari 400/800/XL/XE computers may contain some hard-to-read special characters, so we have a listing system that indicates these control characters. You will find these Commodore and Atari characters in curly braces; *do not type the braces.* For example, {CLEAR} or {CLR} instructs you to insert the symbol which clears the screen on the Atari or Commodore machines. A complete list of these symbols is shown in the tables below. For Commodore, Apple, and Atari, a single symbol by itself within curly braces is usually a control key or graphics key. If you see {A}, hold down the CONTROL key and press A. This will produce a reverse video character on the Commodore (in quote mode), a graphics character on the Atari, and an invisible control character on the Apple.

Graphics characters entered with the Commodore logo key are enclosed in a special bracket: {<A>}. In this case, you would hold down the Commodore logo key as you type A. Our Commodore listings are in uppercase, so shifted symbols are underlined. A graphics heart symbol (SHIFT-S) would be listed as S. One exception is {SHIFT-SPACE}. When you see this, hold down SHIFT and press the space bar. If a number precedes a symbol, such as {5 RIGHT}, {6 S}, or {<8 Q>}, you would enter five cursor rights, six shifted S's, or eight Commodore-Q's. On the Atari, inverse characters (white on black) should be entered with the inverse video

Atari 400/800/XL/XE

When you see	Type	See	
{CLEAR}	ESC SHIFT <		Clear Screen
{UP}	ESC CTRL -		Cursor Up
{DOWN}	ESC CTRL =		Cursor Down
{LEFT}	ESC CTRL +		Cursor Left
{RIGHT}	ESC CTRL *		Cursor Right
{BACK S}	ESC DELETE		Backspace
{DELETE}	ESC CTRL DELETE		Delete character
{INSERT}	ESC CTRL INSERT		Insert character
{DEL LINE}	ESC SHIFT DELETE		Delete line
{INS LINE}	ESC SHIFT INSERT		Insert line
{TAB}	ESC TAB		TAB key
{CLR TAB}	ESC CTRL TAB		Clear tab
{SET TAB}	ESC SHIFT TAB		Set tab stop
{BELL}	ESC CTRL 2		Ring buzzer
{ESC}	ESC ESC		ESCape key

Commodore PET/CBM/VIC/64/128/16/+4

When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME	
{HDME}	CLR/HOME	
{UP}	SHIFT + ↑ CRSR ↓	
{DDWN}	↑ CRSR ↓	
{LEFT}	SHIFT + ← CRSR →	
{RIGHT}	← CRSR →	
{RVS}	CTRL + 9	
{OFF}	CTRL + 0	
{BLK}	CTRL + 1	
{WHT}	CTRL + 2	
{RED}	CTRL + 3	
{CYN}	CTRL + 4	
{PUR}	CTRL + 5	
{GRN}	CTRL + 6	
{BLU}	CTRL + 7	
{YEL}	CTRL + 8	

When You Read:	Press:	See:
{<1>}	COMMODORE + 1	
{<2>}	COMMODORE + 2	
{<3>}	COMMODORE + 3	
{<4>}	COMMODORE + 4	
{<5>}	COMMODORE + 5	
{<6>}	COMMODORE + 6	
{<7>}	COMMODORE + 7	
{<8>}	COMMODORE + 8	
{ F1 }	f1	
{ F2 }	SHIFT + f1	
{ F3 }	f3	
{ F4 }	SHIFT + f3	
{ F5 }	f5	
{ F6 }	SHIFT + f5	
{ F7 }	f7	
{ F8 }	SHIFT + f7	
←	←	

key (Atari logo key on 400/800 models).

Whenever more than two spaces appear in a row, they are listed in a special format. For example, {6 SPACES} means press the space bar six times. Our Commodore listings never leave a single space at the end of a line, instead moving it to the next printed line as {SPACE}.

Amiga program listings contain only one special character, the left arrow (←) symbol. This character marks the end of each program line. Wherever you see a left arrow, press RETURN or move the cursor off the line to enter that line into memory. Don't try to type in the left arrow symbol; it's there only as a marker to indicate where each program line ends.

The Automatic Proofreader

Type in the appropriate program listed below, then save it for future use. The Commodore Proofreader works on the Commodore 128, 64, Plus/4, 16, and VIC-20. Don't omit any lines, even if they contain unfamiliar commands or you think they don't apply to your computer. When you run the program, it installs a machine language program in memory and erases its BASIC portion automatically (so be sure to save several copies before running the program for the first time). If you're using a Commodore 128, Plus/4 or 16, do *not* use any GRAPHIC commands while the Proofreader is active. You should disable the Commodore Proofreader before running any other program. To do this, either turn the computer off and on or enter SYS 64738 (for the 64), SYS 65341 (128), SYS 64802 (VIC-20), or SYS 65526 (Plus/4 or 16). To reenable the Proofreader, reload the program and run it as usual. Unlike the original VIC/64 Proofreader, this version works the same with disk or tape.

On the Atari, run the Proofreader to activate it (the Proofreader remains active in memory as a machine language program); you must then enter NEW to erase the BASIC loader. Pressing SYSTEM RESET deactivates the Atari Proofreader; enter PRINT USR(1536) to reenable it.

The Apple Proofreader erases the BASIC portion of itself after you run it, leaving only the machine language portion in memory. It works with either DOS 3.3 or ProDOS. Disable the Apple Proofreader by pressing CTRL-RESET before running another BASIC program.

The IBM Proofreader is a BASIC program that simulates the IBM BASIC line editor, letting you enter, edit, list, save, and load programs that you type. Type RUN to activate. Be sure to leave Caps Lock on, except when typing lowercase characters.

Once the Proofreader is active, try typing in a line. As soon as you press RETURN, either a hexadecimal number (on the Apple) or a pair of letters (on the Commodore, Atari, or IBM) appears. The number or pair of letters is called a *checksum*.

Compare the value displayed on the screen by the Proofreader with the checksum printed in the program listing in the magazine. The checksum is given to the left of each line number. Just type in the program a line at a time (without the printed checksum), press RETURN or Enter, and compare the checksums. If they match, go on to the next line. If not, check your typing; you've made a mistake. Because of the checksum method used, do not type abbreviations, such as ? for PRINT. On the Atari and Apple Proofreaders, spaces are not counted as part of the checksum, so be sure you type the right number of spaces between quote marks. The Atari Proofreader does not check to see that you've typed the characters in the right order, so if characters are transposed, the checksum still matches the listing. The Commodore Proofreader catches transposition errors and ignores spaces unless they're enclosed in quotation marks. The IBM Proofreader detects errors in spacing and transposition.

IBM Proofreader Commands

Since the IBM Proofreader replaces the computer's normal BASIC line editor, it has to include many of the direct-mode IBM BASIC commands. The syntax is identical to IBM BASIC. Commands simulated are LIST, LLIST, NEW, FILES, SAVE, and LOAD. When listing your program, press any key (except Ctrl-Break) to stop the listing. If you enter NEW, the Proofreader prompts you to press Y to be especially sure you mean yes.

Two new commands are BASIC and CHECK. BASIC exits the Proofreader back to IBM BASIC, leaving the Proofreader in memory. CHECK works just like LIST, but shows the checksums along with the listing. After you have typed in a program, save it to disk. Then exit the Proofreader with the BASIC command, and load the program as usual (this replaces the Proofreader in memory). You can now run the program, but you may want to resave it to disk. This will shorten it on disk and make it load faster, but it can no longer be edited with the Proofreader. If you want to convert an existing BASIC program to Proofreader format, save it to disk with SAVE "*filename*",A.

Program 1: Atari Proofreader

By Charles Brannon, Program Editor

```
100 GRAPHICS 0
110 FOR I=1536 TO 1700:REA
    D A:POKE I,A:CK=CK+A:N
    EXT I
120 IF CK<>19072 THEN ? "E
    rror in DATA Statement
    s.  Check Typing.":END

130 A=USR(1536)
140 ? :? "Automatic Proofr
    eader Now Activated."
150 END
160 DATA 104,160,0,185,26,
    3,201,69,240,7
170 DATA 200,200,192,34,20
    8,243,96,200,169,74
180 DATA 153,26,3,200,169,
    6,153,26,3,162
190 DATA 0,189,0,228,157,7
    4,6,232,224,16
200 DATA 208,245,169,93,14
    1,78,6,169,6,141
210 DATA 79,6,24,173,4,228
    ,105,1,141,95
220 DATA 6,173,5,228,105,0
    ,141,96,6,169
230 DATA 0,133,203,96,247,
    238,125,241,93,6
240 DATA 244,241,115,241,1
    24,241,76,205,238
250 DATA 0,0,0,0,0,32,62,2
    46,8,201
260 DATA 155,240,13,201,32
    ,240,7,72,24,101
270 DATA 203,133,203,104,4
    0,96,72,152,72,138
280 DATA 72,160,0,169,128,
    145,88,200,192,40
290 DATA 208,249,165,203,7
    4,74,74,74,24,105
300 DATA 161,160,3,145,88,
    165,203,41,15,24
310 DATA 105,161,200,145,8
    8,169,0,133,203,104
320 DATA 170,104,168,104,4
    0,96
```

Program 2: IBM Proofreader

By Charles Brannon, Program Editor

```
10 'Automatic Proofreader Vers
   ion 3.0 (Lines 205,206 adde
   d/190 deleted/470,490 chang
   ed from V2.0)
100 DIM L$(500),LNUM(500):CDLD
    R 0,7,7:KEY OFF:CLS:MAX=0:
    LNUM(0)=65536!
110 ON ERROR GOTO 120:KEY 15,C
    HR$(4)+CHR$(70):ON KEY(15)
     GOSUB 640:KEY (15) ON:GOT
    O 130
120 RESUME 130
130 DEF SEG=&H40:W=PEEK(&H4A)
140 ON ERROR GOTO 650:PRINT:PR
    INT"Proofreader Ready."
150 LINE INPUT L$:Y=CSRLIN-INT
    (LEN(L$)/W)-1:LOCATE Y,1
160 DEF SEG=0:POKE 1050,30:POK
    E 1052,34:POKE 1054,0:POKE
     1055,79:POKE 1056,13:POKE
     1057,28:LINE INPUT L$:DEF
     SEG:IF L$="" THEN 150
170 IF LEFT$(L$,1)=" " THEN L$
    =MID$(L$,2):GOTO 170
```

```
180 IF VAL(LEFT$(L$,2))=0 AND
    MID$(L$,3,1)=" " THEN L$=M
    ID$(L$,4)
200 IF ASC(L$)>57 THEN 260 'no
     line number, therefore co
    mmand
205 BL=INSTR(L$," "):IF BL=0 T
    HEN BL$=L$:GOTO 206 ELSE B
    L$=LEFT$(L$,BL-1)
206 LNUM=VAL(BL$):TEXT$=MID$(L
    $,LEN(STR$(LNUM))+1)
210 IF TEXT$="" THEN GOSUB 540
    :IF LNUM=LNUM(P) THEN GOSU
    B 560:GOTO 150 ELSE 150
220 CKSUM=0:FOR I=1 TO LEN(L$)
    :CKSUM=(CKSUM+ASC(MID$(L$,
    I))*I) AND 255:NEXT:LOCATE
     Y,1:PRINT CHR$(65+CKSUM/1
    6)+CHR$(65+(CKSUM AND 15))
    +" "+L$
230 GOSUB 540:IF LNUM(P)=LNUM
    THEN L$(P)=TEXT$:GOTO 150
    'replace line
240 GOSUB 580:GOTO 150 'insert
     the line
260 TEXT$="":FOR I=1 TO LEN(L$
    ):A=ASC(MID$(L$,I)):TEXT$=
    TEXT$+CHR$(A+32*(A>96 AND
    A<123)):NEXT
270 DELIMITER=INSTR(TEXT$," ")
    :COMMAND$=TEXT$:ARG$="":IF
     DELIMITER THEN COMMAND$=L
    EFT$(TEXT$,DELIMITER-1):AR
    G$=MID$(TEXT$,DELIMITER+1)
     ELSE DELIMITER=INSTR(TEXT
    $,CHR$(34)):IF DELIMITER T
    HEN COMMAND$=LEFT$(TEXT$,D
    ELIMITER-1):ARG$=MID$(TEXT
    $,DELIMITER)
280 IF COMMAND$<>"LIST" THEN 4
    10
290 OPEN "scrn:" FOR OUTPUT AS
     #1
300 IF ARG$="" THEN FIRST=0:P=
    MAX-1:GOTO 340
310 DELIMITER=INSTR(ARG$,"-"):
    IF DELIMITER=0 THEN LNUM=V
    AL(ARG$):GOSUB 540:FIRST=P
    :GOTO 340
320 FIRST=VAL(LEFT$(ARG$,DELIM
    ITER)):LAST=VAL(MID$(ARG$,
    DELIMITER+1))
330 LNUM=FIRST:GOSUB 540:FIRST
    =P:LNUM=LAST:GOSUB 540:IF
    P=0 THEN P=MAX-1
340 FOR X=FIRST TO P:N$=MID$(S
    TR$(LNUM(X)),2)+" "
350 IF CKFLAG=0 THEN A$="":GOT
    O 370
360 CKSUM=0:A$=N$+L$(X):FOR I=
    1 TO LEN(A$):CKSUM=(CKSUM+
    ASC(MID$(A$,I))*I) AND 255
    :NEXT:A$=CHR$(65+CKSUM/16)
    +CHR$(65+(CKSUM AND 15))+"
    "
370 PRINT #1,A$+N$+L$(X)
380 IF INKEY$<>"" THEN X=P
390 NEXT :CLOSE #1:CKFLAG=0
400 GOTO 130
410 IF COMMAND$="LLIST" THEN O
    PEN "lpt1:" FOR OUTPUT AS
    #1:GOTO 300
420 IF COMMAND$="CHECK" THEN C
    KFLAG=1:GOTO 290 '
430 IF COMMAND$<>"SAVE" THEN 4
    50
440 GOSUB 600:OPEN ARG$ FOR OU
    TPUT AS #1:ARG$="":GOTO 30
    0
450 IF COMMAND$<>"LOAD" THEN 4
    90
460 GOSUB 600:OPEN ARG$ FOR IN
    PUT AS #1:MAX=0:P=0
470 WHILE NOT EOF(1):LINE INPU
    T #1,L$:BL=INSTR(L$," "):B
    L$=LEFT$(L$,BL-1):LNUM(P)=
    VAL(BL$):L$(P)=MID$(L$,LEN
    (STR$(VAL(BL$)))+1):P=P+1:
    WEND
480 MAX=P:CLOSE #1:GOTO 130
490 IF COMMAND$="NEW" THEN INP
    UT "Erase program - Are yo
    u sure";L$:IF LEFT$(L$,1)=
    "Y" OR LEFT$(L$,1)="Y" THE
    N MAX=0:LNUM(0)=65536!:GOT
    O 130:ELSE 130
500 IF COMMAND$="BASIC" THEN C
    OLOR 7,0,0:ON ERROR GOTO 0
    :CLS:END
510 IF COMMAND$<>"FILES" THEN
    520
515 IF ARG$="" THEN ARG$="A:"
    ELSE SEL=1:GOSUB 600
517 FILES ARG$:GOTO 130
520 PRINT"Syntax error":GOTO 1
    30
540 P=0:WHILE LNUM>LNUM(P) AND
     P<MAX:P=P+1:WEND:RETURN
560 MAX=MAX-1:FOR X=P TO MAX:L
    NUM(X)=LNUM(X+1):L$(X)=L$(
    X+1):NEXT:RETURN
580 MAX=MAX+1:FOR X=MAX TO P+1
     STEP -1:LNUM(X)=LNUM(X-1)
    :L$(X)=L$(X-1):NEXT:L$(P)=
    TEXT$:LNUM(P)=LNUM:RETURN
600 IF LEFT$(ARG$,1)<>CHR$(34)
     THEN 520 ELSE ARG$=MID$(A
    RG$,2)
610 IF RIGHT$(ARG$,1)=CHR$(34)
     THEN ARG$=LEFT$(ARG$,LEN(
    ARG$)-1)
620 IF SEL=0 AND INSTR(ARG$,".
    ")=0 THEN ARG$=ARG$+".BAS"
630 SEL=0:RETURN
640 CLOSE #1:CKFLAG=0:PRINT"St
    opped.":RETURN 150
650 PRINT "Error #";ERR:RESUME
     150
```

Program 3: Commodore Proofreader

By Philip Nelson, Assistant Editor

```
10 VEC=PEEK(772)+256*PEEK(773)
   :LO=43:HI=44
20 PRINT "AUTOMATIC PROOFREADE
   R FOR ";:IF VEC=42364 THEN
   {SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VI
   C-20"
40 IF VEC=35158 THEN GRAPHIC C
   LR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=
   46:GRAPHIC CLR:PRINT"128"
60 SA=(PEEK(LO)+256*PEEK(HI))+
   6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POK
   E ADR,BYT:ADR=ADR+1:CHK=CHK
   +BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*
    ERROR* CHECK TYPING IN DATA
    STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L
   F,LB:POKE SA+HF,HB:NEXT
110 IF CHK<>22054 THEN PRINT "
   *ERROR* RELOAD PROGRAM AND
   {SPACE}CHECK FINAL LINE":EN
   D
120 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+
   14,22:POKE SA+18,23:POKESA+
   29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"
   PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (P
   EEK(LO)+256*PEEK(HI))-1,0:N
   EW
160 DATA 120,169,73,141,4,3,16
   9,3,141,5,3
170 DATA 88,96,165,20,133,167,
   165,21,133,168,169
180 DATA 0,141,0,255,162,31,18
   1,199,157,227,3
190 DATA 202,16,248,169,19,32,
   210,255,169,18,32
200 DATA 210,255,160,0,132,180
   ,132,176,136,230,180
210 DATA 200,185,0,2,240,46,20
   1,34,208,8,72
220 DATA 165,176,73,255,133,17
   6,104,72,201,32,208
230 DATA 7,165,176,208,3,104,2
   08,226,104,166,180
240 DATA 24,165,167,121,0,2,13
   3,167,165,168,105
250 DATA 0,133,168,202,208,239
   ,240,202,165,167,69
260 DATA 168,72,41,15,168,185,
   211,3,32,210,255
270 DATA 104,74,74,74,74,168,1
   85,211,3,32,210
280 DATA 255,162,31,189,227,3,
   149,199,202,16,248
290 DATA 169,146,32,210,255,76
   ,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,
   77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,136
   ,137
```

Program 4: Apple Proofreader

By Tim Victor, Editorial Programmer

```
10 C = 0: FOR I = 768 TO 768 +
   68: READ A:C = C + A: POKE I
   ,A: NEXT
20 IF C < > 7258 THEN PRINT "ER
   ROR IN PROOFREADER DATA STAT
   EMENT5": END
30 IF PEEK (190 * 256) < > 76 T
   HEN POKE 56,0: POKE 57,3: CA
   LL 1002: GOTO 50
40 PRINT CHR$ (4);"IN#A$300"
50 POKE 34,0: HOME : POKE 34,1:
    VTAB 2: PRINT "PROOFREADER
   INSTALLED"
60 NEW
100 DATA 216,32,27,253,201,141
110 DATA 208,60,138,72,169,0
120 DATA 72,189,255,1,201,160
130 DATA 240,8,104,10,125,255
140 DATA 1,105,0,72,202,208
150 DATA 238,104,170,41,15,9
160 DATA 48,201,58,144,2,233
170 DATA 57,141,1,4,138,74
180 DATA 74,74,74,41,15,9
190 DATA 48,201,58,144,2,233
200 DATA 57,141,0,4,104,170
210 DATA 169,141,96
```

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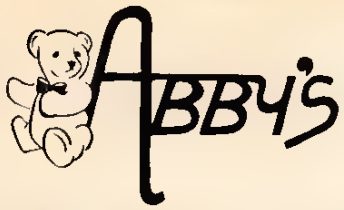

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